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Twelfth International Nuclear Regulatory Inspection Workshop

Experience from the Inspection of Licensees' Outage Activities, Including Fire Protection Programmes, Event Response Inspections, and the Impact of the Fukushima Daiichi NPP Accident on Inspection Programmes

Workshop Proceedings
Chattanooga, Tennessee
United States
7-10 April 2014

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NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

NEA/CNRA/R(2014)8
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Twelfth International Nuclear Regulatory Inspection Workshop on Experience from the Inspection of Licensees Outage Activities, Including Fire Protection Programmes, Event Response Inspections, and the Impact on Inspection, Programmes of the Fukushima Daiichi NPP Accident

Workshop Proceedings

Hosted by the United States Nuclear Regulatory Commission
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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 34 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Korea, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 31 countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, the Republic of Korea, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes;
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

The Committee on Nuclear Regulatory Activities (CNRA) of the OECD Nuclear Energy Agency (NEA) is an international committee made up primarily of senior nuclear regulators. It was set up in 1989 as a forum for the exchange of information and experience among regulatory organisations.

The committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations with regard to safety. The committee's purpose is to promote cooperation among member countries to feedback the experience to safety improving measures, enhance efficiency and effectiveness in the regulatory process and to maintain adequate infrastructure and competence in the nuclear safety field. The CNRA's main tasks are to review developments which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among member countries. In particular, the committee reviews current management strategies and safety management practices and operating experiences at nuclear facilities with a view to disseminating lessons learned.

The committee focuses primarily on existing power reactors and other nuclear installations; it may also consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, the CNRA establishes cooperative mechanisms with the Committee on the Safety of Nuclear Installations (CSNI) responsible for the programme of the Agency concerning the technical aspects of the design, construction and operation of nuclear installations. The committee also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH) and NEA's Radioactive Waste Management Committee (RWMC) on matters of common interest.

FOREWORD

The main purpose of the workshop was to provide a forum of exchange of information on the regulatory inspection activities. Participants had the opportunity to meet with their counterparts from other countries and organisations to discuss current and future issues on the selected topics. They developed conclusions regarding these issues and hopefully, identified methods to help improve their own inspection programmes.

The NEA Committee on Nuclear Regulatory Activities (CNRA) believes that an essential factor in ensuring the safety of nuclear installations is the continuing exchange and analysis of technical information and data. To facilitate this exchange the Committee has established working groups and groups of experts in specialised topics. The Working Group on Inspection Practices (WGIP) was formed in 1990 with the mandate ". . . to concentrate on the conduct of inspections and how the effectiveness of inspections could be evaluated. . . ". The WGIP facilitates the exchange of information and experience related to regulatory safety inspections between CNRA member countries.

These proceedings cover the 12th International Workshop held by WGIP on regulatory inspection activities. This workshop, which is the twelfth in a series, along with many other activities performed by the Working Group, is directed towards this goal. The consensus from participants at previous workshops, noted that the value of meeting with people from other inspection organisations was one of the most important achievements. The focus of this workshop was on experience gained from regulatory inspection activities in three areas:

- Inspection of Outage Activities Including Fire Protection Programmes.
- Event Response Inspections.
- The Impact of Inspection Programmes of the Fukushima Daiichi Nuclear Power Plant (NPP) Accident.

Members of the workshop organising committee wish to acknowledge the excellent planning and arrangements made by the staff of the host organisation, the United States Nuclear Regulatory Commission (NRC). Special recognition is given to the US CNRA members, Mr Eric Leeds and Mr Glenn Tracy, for their leadership and support to the WGIP, and to the US WGIP member, Mr Christopher Regan, for his essential coordination and efforts for the workshop.

Special acknowledgement is given to the WGIP members who facilitated the topic discussion groups, Dr Walter Glöckle, Mr Jukka Kupila, Mr Alexandre Leblanc, Mr Pierre Barras, Mr Zdeněk Tipek, and Mr Arvind Paul Garg.

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1. EXECUTIVE SUMMARY

The main objectives of the WGIP workshops are to enable inspectors to meet with inspectors from other organisations, to exchange information regarding regulatory inspection practices, to discuss the selected topics, to discuss contemporary inspection issues, and to develop conclusions and commendable practices (CPs) on the selected topics.

As part of the registration, participants were asked to respond to a questionnaire describing practices within their own countries on the workshop topics. The complete compilation of questionnaire responses is contained in the appendix (NEA/CNRA/R(2014)8/ADD1) to this document.

Approximately 51 participants from 19 different countries and one participant from IAEA took part in the workshop. Countries included: Belgium, Canada, the Czech Republic, Finland, France, Germany, India, Japan, Mexico, Poland, the Republic of Korea, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Five discussion groups were established for the breakout sessions. One topic would only have one group with 11 participants instead of having two small groups. Each group consisted of inspectors from countries to ensure diversity of views for each of the topics. Discussion groups met for three separate sessions on one topic. The exchange between participants was open and active, and the groups formulated conclusions and identified CPs.

Evaluation of the workshop results were based on questionnaire responses received from the participants at the closing of the workshop. The evaluation showed that, as in the past workshops, the highest value perceived, was in meeting and exchanging information with inspectors from other organisations. Responses also showed that the format selected was highly favoured and that more workshops of this type are supported in the future.

The results of the evaluation also reflected that participants in exchanging information were provided a unique opportunity to “calibrate” their own inspection methods against those from other countries. While exchanging inspection practices and learning new ideas were part of the main objectives, this opportunity to recognise and understand commonalties and differences is equally important.

Overall discussions between the various participants both in discussion group sessions and throughout the workshop were extensive and meaningful. Ideas and practices regarding regulatory inspection activities were exchanged and it can be foreseen that these ideas will provide improved expertise when being applied in the future.

The workshop conclusions include observations and CPs for each topic that were developed by the discussions groups.

2. ORGANISATION AND OVERVIEW OF WORKSHOP

2.1 Planning

Preliminary planning for this workshop, the twelfth in a series, of International Workshops on Regulatory Inspection Activities began following the conclusion of the previous workshop in Baden, Switzerland, in May 2012. Formal planning started following approval by the CNRA at its annual meeting in June 2012.

Members of the WGIP reviewed comments and suggestions made at previous workshops and considered and discussed ways to improve the format of the workshop. The workshop was hosted by the United States Nuclear Regulatory Commission (NRC) in Chattanooga, Tennessee, United States on 7-10 April 2014.

In the evaluation at the previous workshop [references: NEA/CNRA/R(2012)6 and NEA/CNRA/R(2012)6/ADD1], participants suggested topics for discussion at a future workshop. The working group considered these topics and also reviewed various proposals on other contemporary topics that were of interest to the countries. Four potential topics were developed and proposed to the CNRA. The committee approved the workshop and chose three topics for the workshop at the June 2012 CNRA meeting. Members of the workshop organising committee further defined the issues to be discussed under each of these topics.

The workshop followed the well-established format which was first utilised in 1992 in Chattanooga and has evolved over the continuing series of workshops. The WGIP workshops consist of three topics. The topic discussions occur in parallel. As such, as part of registration, each participant designates the one topic in which he/she will participate. Many countries elect to send three inspectors, one for each topic, so that the country can benefit from all three topics. In the plenary opening session to 'set the scene', the topic leads give the opening presentation based on their analyses of the questionnaire responses. Next, participants divide into small discussions groups to discuss the topic in detail. In general, there are two discussion groups of 7 – 10 participants for each topic. In the plenary closing session, the leads present the results of the discussions and CPs that have been derived, so that all of the workshop participants can benefit from the other topics.

2.2 Announcement and Pre-workshop Activities

The workshop announcement was transmitted in the fall of 2013. As part of the registration form, participants were asked to respond to a questionnaire describing practices within their own countries on the topics for inclusion as pre-workshop information. The responses were used to prepare the opening topic presentation and were used as background material for the group discussions. A compilation of the responses was produced as an appendix to these proceedings (NEA/CNRA/R(2014)8/ADD1).

2.3 Overview of Workshop

Facilitator Training

Prior to the start of the workshop, facilitators attended a training meeting. As the WGIP chair and vice-chair, Mr Olivier Veyret and Mr Julio Crespo led the training. Mr Veyret reviewed the general objectives of the workshop and outlined the various characteristics required of a good facilitator and recorder. He noted the importance of their role in guiding the group, opening discussion, continually monitoring that all of the group members participate in the discussion, and various methods to manage an effective discussion. Mr Veyret and Mr Crespo reviewed techniques to promote active participation. They also discussed various alternatives for the two discussion groups for each topic to interact during the workshop, such that each group has the opportunity to follow independent discussion paths but also benefit for some interaction with the other group. Next, the two facilitators for each topic met to review the various issues transmitted via the questionnaires and to outline major points to be covered in the discussion sessions.

Meet-and-Greet Session

The evening before the workshop, a reception was held to allow participants to meet each other in an informal setting. Mr Veyret welcomed the attendees, introduced the group's leads, and encouraged participants to introduce themselves to their leads. This informal session allowed the workshop to begin in a more productive manner given that initial introductions have been completed.

Opening Session

Mr Victor McCree, Administrator of the NRC's Region II office located in Atlanta, Georgia welcomed participants to Chattanooga. He provided a presentation that covered the following topics: Environmental Scan, Fulfilling NRC's Mission, The Importance of Good People, and the Fukushima NPP Accident. The environment scan topic included the current and future status of nuclear reactors in the United States. Mr McCree's presentation on the NRC's Mission included an overview of current Reactor Oversight Process focus areas such as flooding and program implementation. He also included an overview of major areas of international engagement. With respect to the importance of good people and good communications, he stressed having expertise in high reliability organisations, defence in depth in knowledge, that wisdom enables credibility, and that people are our most important asset. He provided an overview of a recent NRC senior management visit to Fukushima, Japan. He shared the following lessons: the U.S. industry and the NRC need to prepare for the unexpected ensure that U.S. licensees fully implement, maintain, and appropriately exercise the measures associated with the post-Fukushima actions directed by the NRC, and the NRC and U.S. industry need to maintain an appropriately deep level of technical expertise within their respective organisations. Mr McCree's presentation set the tone for the workshop. He encouraged the participants to actively participate.

Mr Olivier Veyret, Chairman of WGIP, welcomed the participants and noted the importance and relevance of this type of workshop and the excellent opportunity it presented to both inspectors from OECD Member countries and non-member countries to meet and exchange information on important issues.

Ms Nancy Salgado, NEA Deputy Head of Nuclear Safety Division and WGIP technical secretariat, provided a welcome on behalf of the Nuclear Energy Agency CNRA. She provided the context of the senior regulators that serve on the CNRA and expressed their support and expectations for the workshop. Additionally, she noted that a major benefit for the countries was for the participants to apply the information to the inspection programme when they return to their regulatory organisation.

The leads reviewed the questionnaire responses and created opening presentations. The opening presentation summarized the responses and suggested additional questions for the discussion groups. The presentations are summarized in the topic chapters. The topics and presenters were as follows:

1. Dr Walter Glöckle, UM BW, Germany, on the Inspection of Outage Activities Including Fire Protection Programmes.

2. Mr Jukka Kupila, STUK, Finland, on Event Response Inspections.

3. Mr Alexandre Leblanc, CNSC, Canada, on the Impact on Inspection Programmes of the Fukushima Daiichi NPP Accident.

Group Discussion Sessions

Participants were divided into five discussion groups, based on their preference given at registration, to discuss topics. Three half-day sessions were held. A facilitator and recorder worked with each group to stimulate and encourage discussions. For each two topics, there were two discussion groups, and for one topic there was one group. The group leads coordinated time for the participants to interact as well as time to have sufficient time for good discussion.

Presentations by Host Country Representatives

Several representatives from the NRC presented information on current topics of interest.

Host Country Presentation –"Insights into the Use of Risk in Regulatory Oversight" by Mr John Hanna, Senior Reactor Analyst, NRC Region II Office

Mr Hanna began his presentation with an overview of the different processes for assessing risk within the NRC including the characterization of inspection findings and violations. He provided the context that the United States has non-standardized reactor designs and that can provide challenges during the assessment process.

Mr Hanna provided information on recent external events. These included flooding issues at Watts Bar and Sequoyah NPPs, a tornado at Browns Ferry, and a seismic event at North Anna NPP which resulted in a loss of offsite power. He posed questions regarding the cause of this trend of larger significant external events and if our inspectors are as prepared to inspect and respond to external events as they are for internal events. Mr Hanna discussed other challenges with respect to external events including determining the frequency of "rare events," significant geographical and metrological differences especially in the US, and the opportunity for enhanced training on how to perform such analyses.

Mr Hanna concluded his presentation by covering the advantages of the Significance Determination Process which included standardized objective criteria for evaluating public safety, flexibility in the use of risk tools, the capability to develop new assessment methods as necessary and that it is an effective use of limited resources.

Host Country Presentation – "Counterfeit, Fraudulent and Suspect Items (CFSI)" by Ms Andrea Valentin, Deputy Director, Division of Construction Inspection and Operational Programs, Office of New Reactors

Ms Valentin began her presentation by stating that with the supply of parts being global, the move to digital components, and new reactor designs, the NRC continues to be focused on our licensee's review of material to ensure there are no counterfeit, fraudulent, or suspect items (CFSI). While CFSI are continually identified in other industries, there have been no incidents of CFSI in NRC regulated facilities.

Ms Valentin presented examples of non-nuclear industrial CFSI. One example she raised involved counterfeit fire-protection equipment in non-nuclear settings. She stated that the NRC staff had issued an Information Notice to raise awareness of this issue.

Ms Valentin provided information on the types of international and US initiatives in place to ward against CSFI. She stated that a key attribute of these initiatives is that industries are proactive versus reactive. Industries need to plan and protect against the threats. She stated that the NRC staff is planning to issue a Generic Communication to describe the NRC framework for addressing the issue of CFSI.

Ms Valentin stated that sharing operating experience is the key. She also recommended that CFSI language be included in Purchase Orders. She stated that it is important to ensure that existing CFSI does not stay in the supply chain.

Ms Valentin concluded with a list of vendor inspection questions and other initiatives the NRC staff is taking. She stated that the Commercial Grade Dedication Pilot Inspection Report will be issued soon.

Host Country Presentation – "Power Reactor Transition from Operating to Decommissioning" by Mr Robert Orlikowski, Branch Chief, Region III, Division of Nuclear Material Safety Material Control, ISFSI, and Decommissioning

Mr Orlikowski began his presentation with the status of the US nuclear reactors that are in the decommissioning process. He provided the reasons that plants shutdown prematurely such as economic conditions or excessive wear of new steam generators.

Mr Orlikowski presented the steps in the decommissioning process from the licensee's decision to shut down the unit which begins with notification of permanent cessation. Once the notification is submitted and fuel is removed the licensee can never restart the nuclear plant. The licensee's Post Shutdown Decommissioning Activities Report describes the licensee's approach, their schedule, and estimated costs.

Mr Orlikowski also included a discussion of the challenges with plants that shut down early. These challenges affect both the licensee and regulator. He stated that there is not as much lead time to prepare which includes development of documentation such as shutdown technical specification. There are a number of steps in the licensing process to transition from operating to decommissioning which includes processing amendments and exemptions.

Additional challenges include staffing the control room. Given impending shutdown, operators become aware there is a time limit in their position and may be motivated to seek other employment.

Once in decommissioning, the licensee is no longer under the NRC's Reactor Oversight Process. The inspection program continues with a resident inspector onsite for approximately 6 – 12 months. Areas of inspection include monitoring radiation exposure and the plant's susceptibility to cold weather.

Host Country Presentation – "A Day in the Life of a Nuclear Plant Resident Inspector" by NRC

The panel for this topic included a senior resident inspector assigned to an NPP from each of the NRC's four regional offices (Mr Dave Werkheiser, Mr Mike Cain, Mr Greg Roach, and Mr Tony Brown), and a regional branch chief responsible for incident response and reactor health physics inspections (Mr Jim Noggle).

The panel began their presentation with a short video that presented an overview of the NRC Resident Inspector program and highlighted NRC inspectors conducting inspections at NPPs in the US.

The panel presented an overview of their areas of responsibility which includes conducting the baseline inspection program, event response, and assessing licensee performance. They provided a timeline of a typical day of a senior resident inspector and presented a summary of the areas or topics that they are responsible for inspecting.

Each of the senior resident inspectors provided specific information about their assigned site. The four senior resident inspectors are assigned to sites of different reactor designs, in diverse geographical areas, with unique features and challenges. Some of the plants are located adjacent to decommissioned sites and some are located adjacent to new construction sites. Other differences noted by the panel for each of plants that they are responsible for included: refuelling cycles, ultimate heat sinks, number of owners, interface with state and local government officials, and members of the public.

Mr Noggle provided an overview of the inspection effort conducted by NRC inspectors not assigned to a site. Those inspectors are assigned to each of the four regional offices and are the experts in areas that include engineering, fire protection, health physics, in-service inspection, emergency preparedness, incident response, and security. He described how the on-site and region-based inspectors work together to complete the baseline inspection program at each of the sites.

Closing Presentation of Topics

A closing presentation on each of the workshop topics was made by the facilitators. Each presentation was followed by general questions and comments from the floor. Each of the groups developed a set of commendable inspection practices based on their discussions.

CPs are extracts from the topics, which were discussed by the workshop participants and were thought to be reference for Member countries. These are neither international standards nor guidelines. Each country should determine inspection practices, considering its own historical, social and cultural backgrounds and the CPs can be useful reference when each country improves its inspection practices.

Closing Remarks

Mr Veyret remarked on the success of the discussions. He noted, as typical for the inspection practices workshops, that there had been open and frank exchange during the group discussion sessions. He also noted that many of participants took advantage of the scheduled informal sessions to further bilateral exchange. Discussions on the workshop topics have shown that:

- These workshops for inspectors continue to provide a unique environment in which inspectors can exchange information on current issues to gain insights and to also validate their own processes.

- The topics were well developed and the participants were well prepared and made important contributions.

- The development of both CPs and the development of new challenges to be faced were successful and participants and their national organisations would hopefully benefit from the insights gained.

In closing the workshop, Mr Veyret thanked the NRC staff in particular the efforts of a few individuals who made major contributions. Mr Christopher Regan who co-ordinated the organisation efforts, the programme and ensured the success by his diligence and attention to all the many details involved. He also thanked Ms Nancy Salgado (OECD/NEA Technical Secretariat) for her service to the Working Group on Inspection Practices (WGIP), which included support from NEA, all organisational aspects for the groups programme of work and for the group meetings and workshops.

In concluding, Mr Veyret thanked all the workshop participants, facilitators and recorders remarking that without their contributions, hard work, dedication and commitment the workshop would not have been a success.

Technical Excursion Tour of NRC Technical Training Centre (TTC)

As an additional offer to the participants, a technical excursion tour was made to the NRC TTC. Staff members of the TTC provided an introduction and a guided tour of the centre, including simulators.

Reception and Dinner

A reception and dinner was held mid-way during the workshop. Participants were given the opportunity to socialise and exchange information in an informal setting. This dinner was an excellent means to meet other workshop participants that are outside of their discussion group and encouraged international bilateral exchanges.

3. TOPIC A: INSPECTION OF LICENSEE'S OUTAGE ACTIVITIES INCLUDING FIRE PROTECTION PROGRAMMES

3.1. Topic Introduction

Outages are an important opportunity for licensees to undertake plant maintenance, inspections, modifications and other activities necessary to ensure the continued safety of NPPs. Fire is a significant contributor to risk on NPPs. Recent activities within the CNRA dealt with fire inspection programmes (CNRA WGIP report on Fire Inspection Programmes, June 2009) and the operation experience (CNRA Summary report on Operating Experience Feedback Related to Fire Events and Fire Protection Programmes, February 2009). The main conclusion in the CNRA report of June 2009 was: "Both routine and special inspections in the area of fire protection should be performed during all operational modes by appropriate trained inspectors." Thus, fire protection was one of the important aspects to be considered in the frame of this topic.

The scope of the workshop was limited to planned NPP routine outages and included: the consideration of NPP outage work scope; Regulatory body (RB) inspection scope; nuclear and fire risk minimisation; resolution of outage findings that may affect start-up; and arrangements for restart of the NPP. The scope relating to fire protection included both nuclear and conventional fire safety. The focus of this workshop topic was to identify CPs by the RB for gaining confidence that safety will be maintained during an outage, return to service and the following operating cycle of the NPP.

3.2. Discussion Group Members

Inspection of Licensee's Outage Activities Including Fire Protection Programme								
Group 1					Group 2			
Dr	Walter	Glöckle	Germany		Mr	Pierre	Barras	Belgium
Mr	Christopher	Regan	USA		Mr	Hans	Fierz	Switzerland
Mr	Jean-Pierre	Cayla	France		Mr	Raymundo	Gomez-Monterrubio	Mexico
Ms	Carol	Chan	Canada		Mr	Hiro	Koizumi	Japan
Mr	David	Werkheiser	USA		Ms	Heather	Davis	Canada
Mr	Bruce	Archer	UK		Mr	James	Noggle	USA
Mr	Carlos	Garcia	Spain		Dr	Burkhard	Forell	Germany
Mr	Young - Bum	Bae	Korea		Mr	Adnan	Kozarcanin	Sweden
Mr	Marcin	Dabrowski	Poland		Dr	Chang-Ju	Lee	Korea
Mr	Jan	Heikkila	Finland		Mr	Miroslav	Jakes	Czech Republic

3.3. Pre-workshop Questionnaire

For preparation of the workshop, participants were invited to supply their national inspection approaches used according to the following questionnaire:

1. Regulatory requirements

a. What are the regulatory requirements governing the outage of NPPs?

b. What are the regulatory requirements relating to fire protection at NPPs during outages?

2. Outage scope and content

The following questions concern the review of outage scope and content by the RB with the licensee prior to the outage.

a. What types of pre-outage interactions (e.g. meetings, reports) are held between the RB and the licensee?

b. What documentation is supplied and what discussions are held in pre-outage interactions (e.g. test plan, modifications, regulatory commitments, in-service inspection, quality assurance, fire safety, etc.)?

c. What influence does the RB have on the scope, content and planning of NPP outages? Is there a formal approval required from the RB on the outage scope?

d. Does the RB define preconditions for restart?

3. RB outage inspection scope

The following questions concern the scope and resourcing of inspections carried out by the RB during an NPP outage.

a. Does the RB explicitly define by internal procedure a list of topics that it will inspect during an outage and if so what are they?

b. Which of the following topics are typically inspected by the RB?

- safety culture;
- operating experience;
- qualification of licensee staff/contractors;
- fire protection;
- radiological protection;
- control of foreign material (FME);
- housekeeping;
- industrial safety (personal safety);
- working time;
- management of contractors;
- security;
- environmental issues;
- modifications;
- quality assurance;
- in-service inspections (periodic tests);
- pressure boundaries;
- outage management;
- maintenance activities;
- handling of fuel elements;
- specific technical areas (e.g. structural integrity, electrical, etc.).

c. What type and how much inspection resource is utilised (e.g. RB inspection staff, RB specialist, and technical support organisation manpower)?

d. What inspections are undertaken by the RB to evaluate that the licensee has minimized nuclear safety risks during the outage?

4. Fire safety

The following questions concern fire safety maintenance programmes, the impact of outage activities on fire safety and arrangements for response to a fire.

a. What inspections are undertaken by the RB regarding oversight of the maintenance of fire protection systems during an outage?

b. What inspections are undertaken by the RB of the licensee's ability to control fire risks arising during an outage (e.g. hot work, fire loading, etc.)?

c. How does the RB evaluate that the licensee's arrangements for response to fire during an outage are adequate?

5. Outage findings

The following questions concern RB follow-up on outage findings[1] (e.g. test results, in-service inspection (ISI) results) and events (e.g. leaks, fire, workforce accidents, reportable and non-reportable events) and their resolution.

a. How is the RB informed of any findings and events arising during the outage?

b. How does the RB respond to findings and events (e.g. specific resources, specific inspections)?

c. Is the RB routinely informed of all fire occurrences?

d. How does the RB assess that any findings are evaluated in a timely manner?

6. Outage key stages, restart, and post outage actions

The following questions concern the monitoring of progress by the RB during an NPP outage, RB witness points, authorisation for restart, post outage review and relevant post outage testing

a. What arrangements does the RB have to monitor progress with the outage program (e.g. daily reports, routine meetings, database access)?

b. Does the RB define any formal witness or hold points during the outage and if so what are they?

c. Does the licensee require formal authorisation from the RB before restart, and if so what is the RB decision making process to allow the restart?

d. What type activities (if any) are undertaken by the RB after restart (e.g. inspection of physics tests, review of licensee lessons learned, etc.)?

7. Are there any other important topics that you would like to be considered at the workshop?

[1] Identified either by the RB or the licensee

3.4. Topic A Opening Presentation

To provide the two discussion sub-groups with a common basis for discussing the topic, Dr Walter Glöckle made a presentation summarising the different responses he received to the pre-workshop questionnaire that has been sent to the participants prior to the workshop itself.

During outages, a lot of activities are performed such as plant maintenance, plant modifications, inspections performed by the licensee, refuelling and restart activities. Outage activities may be combined with hot work, additional fire loads or reduced availability of fire protection systems and as a consequence with increased fire risks. At the same time, the numerous outage activities lead to specific challenges for nuclear safety e.g. because of open barriers, the reduced availability of safety systems and the implementation of modifications.

Concerning inspection, the outage activities require the RB to perform inspections to survey status of SSC and resolution of outage findings, to ensure that safety is maintained by the licensee during maintenance and modification activities and to assure that the plant is ready for safe restart and the new operating cycle.

Seventeen countries provided responses to the pre-workshop questionnaire. The review of these answers showed the following:

- In most countries, a general requirement e.g. for in-service inspections, maintenance, periodic tests exists prescribing outage intervals.
- Some countries formally authorize restart after outage or set some hold points (e.g. refuelling).
- In all countries, licensee has to provide information about the outage prior to the outage.
- In almost all countries meetings are held to discuss the outage programme. The RB can add actions to the outage programme; in a few countries, the RB approves the outage programme.
- The RB monitors the outage progress on basis of daily information (via reports, meetings, telephone calls etc.).
- The restart preconditions are nearly the same in all countries (outage work finished, deficiencies corrected, reactor physics requirements met, Operating Limits and Conditions (OLC) fulfilled).
- After restart different practices are applied in the countries like monitoring or reviewing the start-up tests, reviewing or discussing the outage results and lessons learned or the follow-up of open issues.
- According to fire protection, two prototypes of inspections are found: specific fire protection inspections (led by specialist inspectors, normally not during the outage), and routine inspections (plant walk-downs) with fire protection issues included (performed by the site inspectors, also during the outage).
- The outage inspection topics are determined on basis of either a specific outage inspection list or a general inspection topic list.
- Regarding the formal notification of reportable events, in most countries lower level events are communicated in the daily interaction between licensee and RB.
- In most countries all fire occurrences are communicated whereas in some countries the communication is restricted to major fire events.

3.5. Group Discussion Summary

Both discussion sub-groups exchanged the participants' own inspection experiences. They discussed questions and challenges from their practical work. They recorded opinions, observations and practices and emphasised CPs.

The discussions showed that outage inspection is a good opportunity to train new inspectors. New inspectors can also be beneficial to gain new insights (to have a "fresh set of eyes"). For this purpose inspectors should have sufficient depth of experience to know where to inspect ("informed" inspection focus) and skills to transfer knowledge to junior inspection staff.

According to the experience of the participants, "announced" inspections are more effective than "unannounced" inspections because:

- the right staff is present for interview;
- the documents and records are available to review.

Despite this the discussion sub-groups found that "unannounced" inspections should also be performed (cf. CP 3 in section 3.6).

In the area of general outage inspection considerations, three additional discussion results were considered to be CPs (cf. CP 1, CP 2 and CP 4 in section 3.6).

A large amount of activities and safety important issues may be inspected during the outage. Thus a prioritization of the inspection activities according to their safety significance is required. One sub-group discussed in detail how the decision on priorities should be conducted, how the safety significance could be determined, and what sort of information from the licensee is necessary and how the inspection effort can be optimised. The discussion resulted in four CPs (cf. CP 5 to CP 8 in section 3.6).

The other sub-group discussed in detail why fire protection inspections should be arranged during the outage phase and how they can be performed. It was found important to perform fire protection inspections during an outage, because of:

- increased hot-work during the outage;
- greater amount of combustible material onsite/in storage;
- loss of normal fire separation;
- unavailability of fire protection systems;
- opportunity to inspect inaccessible systems, areas, and rooms;
- increased number of contractor staff onsite.

There should be a focus on inspection inside containment (sensors, hoses, fire loading in each area/zone) and on fire protection train separation and electrical fire wrapping issues.

The observations and findings from outage inspections should be used to inform programme inspections performed during normal plant operation.

Using fire protection specialists (from the home office) can bring insights from inspection at other facilities or sites. These fire protection inspection specialists should also be trained in nuclear safety.

After a fire event, the follow-up inspection should include evaluation of:

- repeatability of events;
- lessons learnt from previous events;
- the licensee's response according to the procedures and plant design.

The discussion resulted in seven CPs concerning fire protection inspections (cf. CP 11 to CP 17 in section 3.6).

Inspections in support of the restart were a discussion item in both sub-groups. It was concluded that independent on whether a formal restart approval is required or not, the RB should assess if there are any objections to restart (cf. CP 9 and CP 10 in section 3.6).

Another discussion item was the harmonisation of outage inspections. The inspection practices at different sites may be heterogeneous. Therefore it is a goal of numerous RBs to harmonize the inspection practices. From the discussions three CPs were extracted (cf. CP 18 to CP 20 in section 3.6).

During the workshop the two discussion sub-groups met twice and exchanged views and results. The group participants realised that the two sub-groups either came up with similar results or results they agreed with. Thus the CPs are regarded to be a common result of both sub-groups.

3.6. Topic A - Conclusions and Closing Presentation

The following conclusions emerged from the discussions during the workshop. (Note – These conclusions and the accompanying commendable practices are based on workshop discussions and do not reflect a consensus NEA opinion. Nevertheless, they can be utilized as a general benchmark for basic comparisons of those issues with inspectors from participating countries share).

Although the discussions in the two discussion sub-groups were different (reflecting the individual experiences of the participants and showing different emphasis of aspects of the workshop topic within the groups), the two sub- groups agreed in following CP as a common result. The results were presented in the closing presentation by Dr Walter Glöckle and discussed in the exit meeting.

General Outage Inspection Considerations

CP1: The RB should plan for additional inspection resources and technical support to conduct reactive inspections during the outage as necessary (unexpected test results, events, failures, etc.).

CP2: Due to the increase in the number of meetings and activities during outages inspectors should maximize attendance at licensee's meetings and the number of in-person interactions with licensee's and contractor's staff in the field to gain verbal and non-verbal hints on safety relevant issues.

CP3: Unannounced inspections by the RB (including during nightshifts, weekends and holidays) should be performed because they can yield more realistic information and help ensure unbiased interactions and communication with the licensee staff.

CP4: The RB should be aware of the licensee's contractor relationship, and inspect the licensee/contractor oversight conducted critical activities and performance of major maintenance and modifications (refer to previous workshop "Regulatory Body Oversight of Licensee Contractors").

Prioritization of Outage Inspections

CP5: Prioritization of inspection activities should be conducted by responsible resident or site/dedicated inspectors with the support from regulatory body's specialists and with approval of RB's management.

CP6: Outage scope and schedule should be obtained from the licensee well in advance of the outage to allow for the determination of priorities and observations/hold point/witness points by the RB. This should include an expectation that the licensee inform the RB of the schedule and timing of critical activities especially those that can only be witnessed once.

CP7: Outage inspection priorities should consist of modifications, implementation of corrective actions, functional tests, non-destructive tests, radiation protection, fire protection, etc., which are safety significant. Items that could aid in the determination of the significance include:

- deterministic requirements including Technical Specifications (TS);
- results from Probabilistic Safety Assessment (PSA);
- operating experience;
- fire hazard analysis;
- results from specific assessments (periodic safety review, stress tests, etc.).

CP8: The RB should take advantage of inspections completed outside of the outage period to optimise the inspection efforts during the outage in areas such as:

- management systems;
- QA programmes;
- safety culture evaluations;
- training;
- the licensees oversight of contractors.

Inspections in Support of Facility Restart

CP9: The RB should clearly communicate its expectations on what is necessary for the restart. The RB should seek agreement with the licensee on these expectations. The communication and agreement can be achieved by meetings with a written record. In order to have the possibility to identify emergent issues (events, outage findings, inspection results etc.) in a timely manner, meetings should be routine/periodic.

CP10: A single person or organisational unit should be designated within the RB to collect all inspection results and perform a global assessment at the end of the outage to determine if there any objections to restart. Inspection related areas that should be considered for restart include:

- compliance with TS;
- specific regulatory inspection results;
- systems tested and available;
- containment closeout;
- physics testing and ISI;

- walk downs (leaks, housekeeping, fire loads, fire barriers, elimination of potential sump clogging materials);
- corrective actions for non-conforming conditions;
- completion of modifications significant to safety;
- adequate resolution of technical issues;
- list and justification for actions not completed as planned during the outage.

Fire Protection Inspection during the Outage

CP11: The RB should take advantage of combined inspection with other authorities with similar oversight on worker safety/fire protection. The fire protection inspection activities performed during the outage should also consider experience and knowledge coming from other similar industries.

CP12: The RB should conduct inspection of "unannounced" small scale fire drills which can be more effective to determine readiness. This is conditioned on the licensee being aware and in agreement to the conduct of "unannounced" drills.

CP13: As part of the systematic inspection of the fire protection programme the RB should take advantage of the opportunity, during the outage, to inspect areas that are inaccessible during normal operation.

CP14: The inspector should witness the licensee's inspection/walk down at the very end of the outage of all critical areas, notably in those areas where work was performed in order to assess fire protection requirements are satisfied.

CP15: The RB should inspect at the very beginning of the outage for the premature introduction of combustible materials (often by workers eager to start work). Also to inspect for the extent of flammable fluid leaks present at the beginning of the outage. This should include evaluation of the licensee's efforts to reduce the extent of the flammable fluid leaks throughout the remainder of the outage.

CP16: The inspector should visit the site of a fire after the event, to independently evaluate the event and the licensee's evaluation of the event ("To see with your own eyes.").

CP17: Due to changing plant status and outage activities the RB should ensure/inspect that the licensee's fire risk assessment is maintained as current for both specific works and whole plant assessments. This can be done as part of the review of work permit.

Harmonization of Outage Inspections

CP18: The RB should have inspectors visit other sites (if a site/resident inspector) or have home office inspectors visit a variety of sites during outages.

CP19: The RB should have periodic meetings attended by all inspectors to discuss common outage issues to help ensure consistent implementation of the inspection programme and increase global knowledge and expertise. These meetings should include presentation of outage case studies for peer review and conduct of outage inspection refresher training.

CP20: The RB should perform a periodic self-assessment or internal audit to ensure that conformity with the outage inspection programme exists.

4. TOPIC B: EVENT RESPONSE INSPECTIONS

4.1 Topic Introduction

How RBs respond to events is significant for a variety of reasons. These include: 1) understanding the current status of the reactor, safety barriers, and safety related equipment to mitigate the aftermath of the event; and 2) if the safety of the public and the environment adequately protected. In addition, how the RB follows-up on the root cause and corrective actions associated with the event is important to later inspection activities for that facility. Lastly, strong regulatory oversight and follow-up of an event helps build public confidence in the ability of the regulator.

For the purposes of this workshop an event was defined as an incident that has had significant impact on plant safety. Security and safeguard events, and off-site emergency response, were excluded from this workshop to better focus on reactor safety issues. The workshop session focused on singular events during normal operations and outages which involve an immediate notification of the RB.

4.2 Discussion Group Members

Event Response Inspections								
Group 3					Group 4			
Mr	Jukka	Kupila	Finland		Mr	Zdeněk	Tipek	Czech Republic
Mr	Graeme	Thomas	UK		Mr	Andrzej	Glowacki	Poland
Mr	Michael	Nataf	France		Dr	Matthias	Schneider	Germany
Ms	Suzanne	Karkour	Canada		Mr	Antonio	Maldonado-Hernandez	Mexico
Mr	Loyd	Cain	USA		Mr	Chad	McFarlan	Canada
Mr	Dirk	Asselberghs	Belgium		Mr	Tony	Brown	USA
Mr	Stefan	Sordal	Sweden		Mr	Sebastjan	Savli	Slovenia
Mr	Stephan	Wanke	Germany		Mr	Durk Hun	Lee	Korea

4.3 Pre-workshop Questionnaire

For preparation of the workshop, participants were invited to supply their national inspection approaches used according to the following questionnaire:

1. Event notification and reporting

1.1. Do you have regulations for immediate event notification of the regulator and subsequent reporting requirements?

1.1.1. If yes, please describe the criteria used for event notification and follow-up reports.

1.1.2. Are there regulations for event classification?

1.2. Does your RB provide any additional guidance to licensees on notification and reporting expectations (e.g., written documents)?

1.3. Does your RB have any additional agreements in place with licensees for notifications (e.g., licensee informal calls to the inspector on duty, the resident inspectors or RB's offices)?

2. Immediate Response

2.1. Does your RB require inspectors, either formally or informally, to immediately go to the NPP following an event?

2.1.1. If yes, does your RB have criteria for which events the inspector should go to the site for?

2.1.2. If no, describe your RB approach to event response including any expectations or requirements that they go within a specific timeframe (e.g., one day, one week)?

2.2. Are there specific activities that the inspector is expected to perform when on site (e.g., control room observations, plant walkdown inspections, interactions with plant management)?

2.2.1. If yes, are these activities described in a procedure?

2.2.2. If a safety concern is identified by the inspectors how do they interact with the licensee and their RB to raise the concern (describe normal practices)?

2.3. How does the RB keep the public and other stakeholders (i.e. government) informed of the event and plant conditions?

3. Follow-up Inspections

3.1. Does your RB have a process to perform follow-up inspections of the event once the event has concluded?

3.1.1. If yes, what is the purpose of the inspection?

3.1.2. Are there specific criteria to determine whether an inspection should be performed?

3.1.3. What information (e.g., root cause analysis, corrective actions, operating experience report, event report) does the RB require from the licensee:

3.1.3.1. Prior to initiating an inspection?
3.1.3.2. During the inspection?

3.1.4. Are there time limits for when the inspection should be initiated and completed?

4.4 Topic B - Opening Presentation

Mr Jukka Kupila made a presentation introducing the topic and summarising the different responses he received to the pre-workshop questionnaire that has been sent to the participants prior to the Workshop itself. It was highlighted that significant events are very demanding situations for the regulators. First, the regulators have to be sure that they have a good understanding of the technical situation in order to determine the most appropriate actions to be implemented to protect safety of the people and environment if necessary. Eventually, regulators need to be sure that all the necessary improvements are implemented and licensees take into account all aspects that contributed to the event. Finally, regulators need to keep the public and the government informed about any significant events. Media organisations and social media networks may require quick and accurate information from the regulators which can be very challenging for the RBs.

The review of the answers provided by the participants to the pre-meeting questionnaire shows that:

- Regulators have established reporting criteria through guides which are often quite detailed.
- Reactive inspections are usually performed, either immediately or after an analysis of the situation. Some regulators have detailed inspection procedures; others may use more general guidance or leave inspectors to decide the best approach.

Mr Kupila proposed to the group an open discussion based on the conclusions on this review focusing on the criteria, the formalization of the systems of information and the actual regulatory response.

4.5 Group Discussion Summary

Discussions started with participants giving examples of typical event response by the regulatory body. These initial discussions were considered helpful to gain insights to other regulatory bodies and their typical activities during events. Group discussions were carried out in two subgroups and discussions followed the three areas of the questionnaire:

- notification and initial reporting;
- immediate response and communication with stakeholders;
- follow-up inspections.

Subgroups met during the final phase of the discussions and it was noted that both subgroups shared very similar opinions and participants agreed with the both subgroup´s results. A final summary was then compiled together with topic leads.

4.6 Topic B - Conclusions and Closing Presentation

The following statements emerged from discussions during the workshop (Note - These conclusions and the accompanying CPs are based on workshop discussions and do not reflect a consensus NEA opinion. Nevertheless, they can be utilised as a general benchmark for basic comparisons of those issues

which inspectors from participating countries share). Also the groups tried to identify some practical means to achieve the proposed commendable practices.

Notification and initial reporting

It was noted during discussions that resident/site inspectors are quite often called formally or informally during events. This was considered quite helpful.

CP1: RB must ensure that licensees provide timely, accurate information throughout an event to allow the RB to provide independent and clear information to all stakeholders.

To achieve this:

- RB must ensure through witnessing, surveillance, monitoring and inspection that licensees follow notification/reporting arrangements.
- RB could also evaluate their own practices in order to improve their performance (de-briefing, self-assessment).
- Informal arrangements between RB and licensee are considered a tool for efficient communication. This allows RB to provide more accurate and timely information to the stakeholders.

Immediate response and communication with stakeholders

It was noted during discussions that some RBs use real time data link to provide direct monitoring of key plant parameters to provide quick and detailed information of the plant status. These systems are usually established for emergency preparedness purposes. Competence of inspectors is important in abnormal situations. Also guidance or procedures may help inspectors to work in quick and demanding situations. Inspectors´ presence at the plant during events enhances understanding of the event and the licensee's response.

Communication with stakeholders (public, media and government) was also discussed and use of website was the most often mentioned tool to inform public. Social media was also mentioned. Timing and level of information provided to government varies from country to country.

CP2: RB should attend in person, at the earliest opportunity to observe the licensee's response. RB needs to ensure that the licensee's actions are focused on nuclear safety. RB needs to ensure the protection of the public and the environment. To achieve this:

- RB should have access to all meetings considered important by the RB. This promotes openness and transparency. The RB should remain independent of the licensee's processes.
- The RB may challenge the licensee on issues of nuclear safety concern. In the case of a significant safety issues, the licensee's response needs to be documented with supporting technical analysis.

CP3: Press releases should be coordinated between licensee and the RB in order to provide accurate information to public

Follow up Inspections

It was noted during discussions that the purpose of follow-up inspections is to verify the thoroughness of the licensee's investigation and corrective actions. However a broader approach, like inspecting the whole operating experience feedback process, may be considered. Type and extent of any follow-up inspection depends on the significance of the event. As a single interesting aspect it was noted that some RB may perform independent root cause analysis. There were no CPs identified in this area.

5. TOPIC C: IMPACT ON INSPECTION PROGRAMMES OF THE FUKUSHIMA DAIICHI NPP ACCIDENT

5.1 Topic Introduction

The Fukushima Daiichi NPP Accident had a significant impact on RBs. Many RBs reacted to the accident by reviewing their regulatory framework, licensing requirements, and inspection programmes. The purpose of this workshop topic was to explore how the reviews led to changes in inspection programmes. The focus of this workshop topic was to identify CPs by the RBs for gaining confidence that safety will be maintained in case of severe accidents. Note that the questions were for actions and changes imposed on the licensee, and not for changes made to how the RB manages an accident.

5.2 Discussion Group Members

The Impact on Inspection Programmes of the Fukushima Daiichi NPP Accident								
Group 5								
Mr	Alexandre	Leblanc	Canada		Mr	Arvind-Paul	Garg	India
Mr	Steve	Campbell	USA		Mr	Tim	Kobetz	IAEA
Mr	Michal	Melicharek	Slovak Republic		Mr	Gregory	Roach	USA
Mr	Michel	Lemay	Canada		Mr	Peter	St. Michael	Canada
Mr	Per-Olof	Hagg	Sweden		Mr	Patric	Scheib	Germany
					Mr	Sergey	Khlabystov	Russia

5.3 Pre-workshop Questionnaire

For preparation of the workshop, participants were invited to supply their national inspection approaches used according to the following questionnaire:

1.0 NATIONAL RESPONSE

1.1 What changes in regulations or national standards have been made or are planned that affects your inspection programme?

1.2 What are the changes at the national level for managing nuclear emergencies? How will they affect your inspection programme?

1.3 Have any changes in RB organisation been made (or planned) post Fukushima? How will these changes affect your inspection programme?

2.0 LICENSEE EMERGENCY PROGRAMMES

2.1 Are there any changes in the licensee's emergency preparedness programmes? What impact will they have on your inspection programme?

2.2 Have any changes in licensee organisations been made post Fukushima?

2.3 Are there any changes in NPPs minimum complement of staff in view of the Fukushima accident?

3.0 TECHNICAL OR ENGINEERING CHANGES TO PLANTS

3.1 What are the changes with respect to severe accident management guidelines (SAMGs) assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Will any changes in the inspection programme be required?

3.2 Are there changes in RB inspection practices due to changes imposed by Fukushima on technical specifications, surveillance and testing of equipment & systems and maintenance programme?

3.3 What are the implications of multiunit sites on your inspection programme (such as common services)?

3.4 What are the required major modifications planned/carried out by the licensee in response to the Fukushima Daiichi NPP Accident? Therefore, will any changes in the assessment and inspection by the RB be made?

3.5 What are the plans of RB to Inspect/assess plant design condition with respect to external events such as flood, cyclone, earthquake etc.?

3.6 What are the changes in emergency operating procedures such as extended station blackout etc? How will this affect the inspection programme?

4.0 POST FUKUSHIMA INSPECTION PROGRAMME CHANGES

4.1 Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?

4.2 Are there any changes in frequency, scope, method of inspections conducted by RB post Fukushima?

5.0 TRAINING AND QUALIFICATION

5.1 Does RB have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?

5.2 What are the expected changes in training of operators and RBs oversight for the training programme post Fukushima? Any impact on simulator based training and the inspection programme.

5.3 How does RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents (BDBA)?

5.4 Topic C - Opening Presentation

To provide workshop participants with a common basis for discussing Topic 3, Mr Alexandre Leblanc delivered a presentation which summarised responses received to the pre-workshop questionnaire.

The high significance of the Fukushima Daiichi NPP accident has had a profound and lasting impact on the industry. Its importance has already largely influenced nuclear regulation in the OECD member countries, where licensees have, or are in the process of:

- Revisiting the analysis of design basis accidents (flooding, earthquakes, etc.).
- Focusing attention on enhancing safety of NPPs against extreme natural events.

What we are seeing at many NPPs throughout the world is the installation of new systems, structures and components (SSC), the addition of mobile emergency equipment as well as increased staffing levels.

In addition, regulatory bodies have reviewed, or are in the process of reviewing, their regulatory framework, licensing requirements and inspection programmes to incorporate lessons learnt from the Fukushima Daiichi NPP Accident. Changes include the modification of Acts, converting guidelines into requirements, incorporating severe accident management into regulations, revising emergency preparedness plans and modifying control & mitigation strategies and procedures.

Responses to the questionnaire indicated that physical modifications to NPPs and changes to regulatory requirements have had little to no impact on baseline inspection programmes. However, some RBs have adapted their overall inspection programmes to include focused and/or one-off type inspections to verify the installation and implementation of new SCCs, mobile emergency equipment, etc. For other RBs, the effect of Fukushima Daiichi NPP accident on their overall inspection programme and/or baseline inspection programme is not yet known. Nonetheless, it is safe to assume modifications of some sort will be necessary to reflect changes made in NPPs design assessment.

After the immediate response of RBs to the Fukushima Daiichi NPP Accident, it is now time to reflect on, consider and, if necessary, implement long term changes to RB inspection programmes. These may include changes in frequency, scope and methodology of regulatory compliance inspections.

5.5 Group Discussion Summary

Given there were only 11 participants for this topic, it was decided to merge the two sub-groups into one.

Even though countries are in different stages of reviewing their regulatory framework, licensing requirements and inspection programmes, the exchange of experience and practices among participants was very productive. In addition to identifying numerous commendable inspection practices, ideas of how to implement them were also discussed and can be found in the closing presentation.

In the end, the group discussed the following 8 topics as well as challenges; inspection practices, emergency preparedness, inspection of revised design basis, inspection of new areas, inspection practices at multi-unit sites, assessment of operators to work under stress, oversight of licensee’s training program and training of inspectors.

5.6 Topic C - Conclusions and Closing Presentation

The following conclusions emerged from discussions during the workshop (Note – These conclusions and the accompanying CPs are based on workshop discussions and do not reflect a consensus NEA opinion. Nevertheless, they can be utilised as a general benchmark for basic comparisons of those issues which inspectors from participating countries share).

CPs practices for gaining confidence that mitigating strategies are in place to handle severe accidents are:

CP1: One time inspection to verify that the design basis is respected for topics and issues highlighted by the Fukushima Daiichi NPP accident

CP2: Verification of design and procedures through reasonable simulations and plant walk downs.

CP3: Conducting off-hour inspections could be of benefit to verify licensee preparedness during backshift.

CP4: Inspect full scale emergency preparedness exercise with entry into SAMGs.

CP5: Consider modifying inspections to focus on the availability of resources for the execution of the licensee's emergency preparedness plan for a SAMG event or a BDBA.

CP6: Site inspectors should observe emergency preparedness exercises at more than just one NPP site.

CP7: If, post Fukushima, there is a revised design basis, carry out inspections to verify that vulnerabilities of systems, SSC were addressed by the licensee.

CP8: Following Fukushima, periodic inspections on flooding hazards should be considered.

CP9: Following Fukushima, periodic inspections on seismic hazards should be considered.

CP10: Inspect emergency preparedness exercises that affect more than one unit at a multi-unit site.

CP11: Consider assessing licensee staff's capability to work under higher than normal stress situations.

CP12: Consider observing simulator training of operators for scenarios that enter BDBA and SAMG.

CP13: Consider verifying that licensee staff is trained to use SSCs for the mitigation of severe accidents.

CP14: Consider verifying that the licensee has established proper personnel support for SAMG events (e.g. design engineers, physicists, etc.).

CP15: Consider implementing a structured training process for the roll-out of new regulatory requirements.

CP16: Consider training site inspectors on SAMG-related modifications and new/revised NPP procedures.

The following challenges were identified:

1. Licensee resistance to conduct costly simulations/tests (i.e. cost vs. benefit).
2. Inspectors have to rediscover their site following a revised design basis (before conducting inspections).
3. Develop and implement training on SAMGs for a variety of plant designs.
4. Adequate support for site regulatory staff following a BDBA or SAMG event.

6. GENERAL WORKSHOP CONCLUSIONS

Overall discussions between the various participants both in discussion group sessions and throughout the workshop were extensive and meaningful. Ideas and practices regarding regulatory inspection activities were exchanged and it can be foreseen that these ideas will provide improved expertise when being applied in the future. WGIP members continue to agree that: "The workshops on regulatory inspection practices held by the CNRA Working Group on Inspection Practices, continue to provide a unique opportunity for inspectors and inspection managers of NPPs to meet and share and exchange information."

The topic chapters include the conclusions and CPs that evolved from the various group discussions. CPs are extracts from the topics, which were discussed by the workshop participants and were thought to be reference for member countries. These are neither international standards nor guidelines. Each country should determine inspection practices, considering its own historical, social and cultural backgrounds, and the CPs can be useful references when each country improves it inspection practices.

7. WORKSHOP EVALUATION

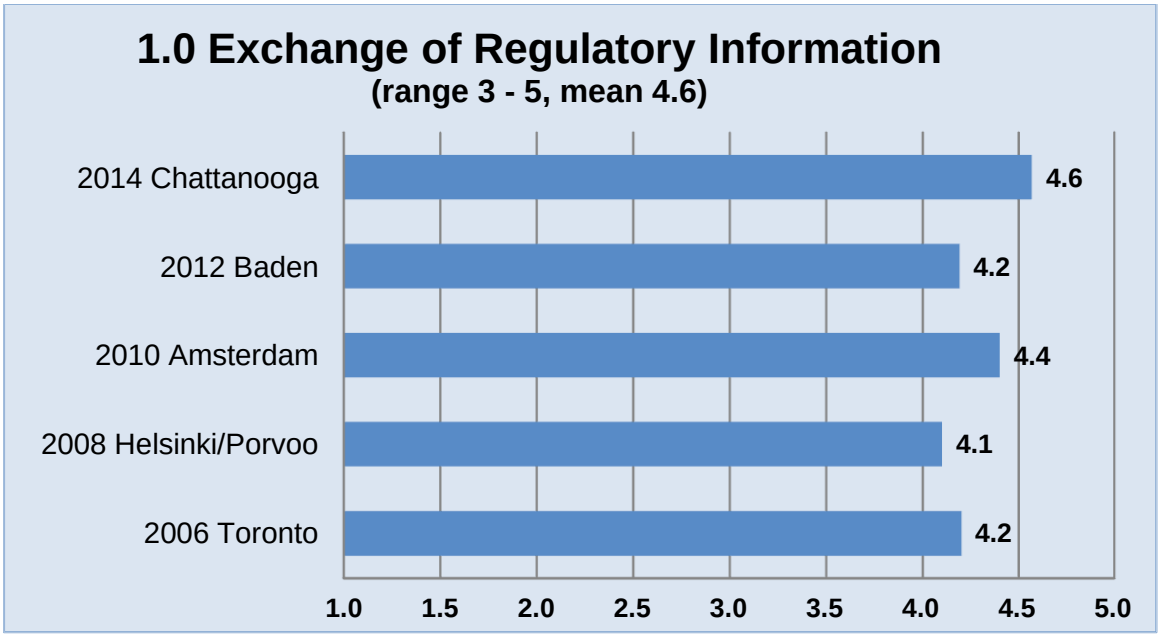
7.1 Evaluation Form Results

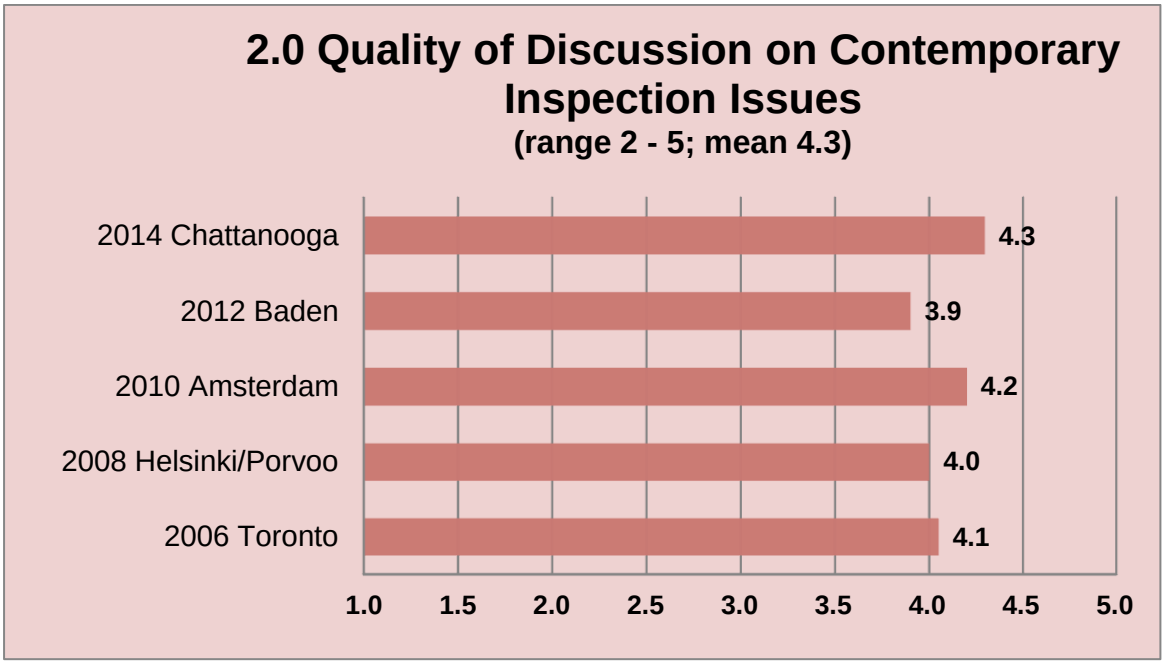
All participants at the workshop were requested to complete an evaluation form. The results of this questionnaire summarised below, are utilised by WGIP in setting up future workshops and to look at key issues for in the programme of work over the next few years. Of the 51 total participants 45 responses were received.

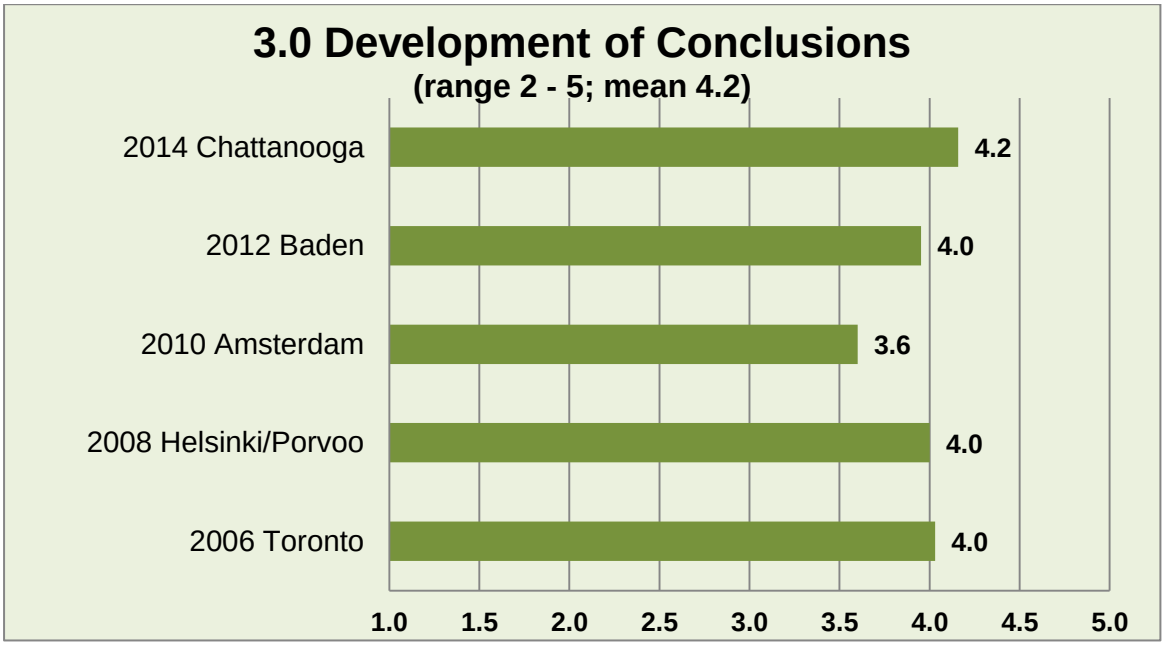
The evaluation form, which was similar to ones issued at previous workshops, asked questions in four areas: general - workshop objectives, workshop format, workshop topics and future workshops. Participants were asked to rate the various questions on a scale of one to five, with one being a low (poor) score and five being a high (excellent) score. Results are provided in the following charts (which also reflect scores from the previous workshops - for comparison purposes) along with a brief written summary.

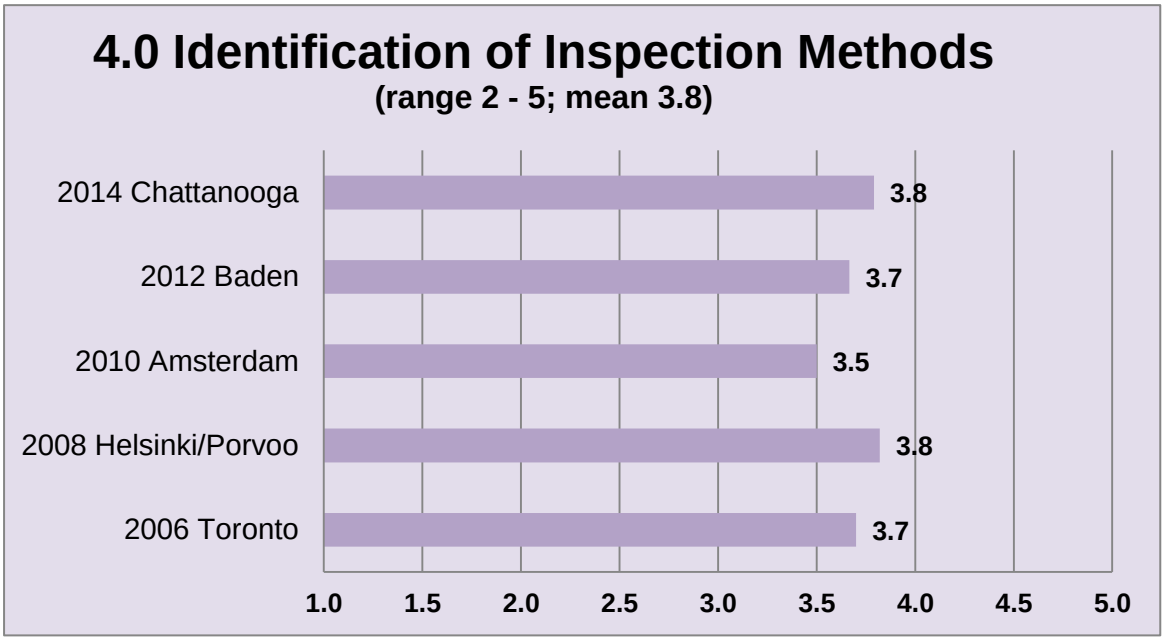
General

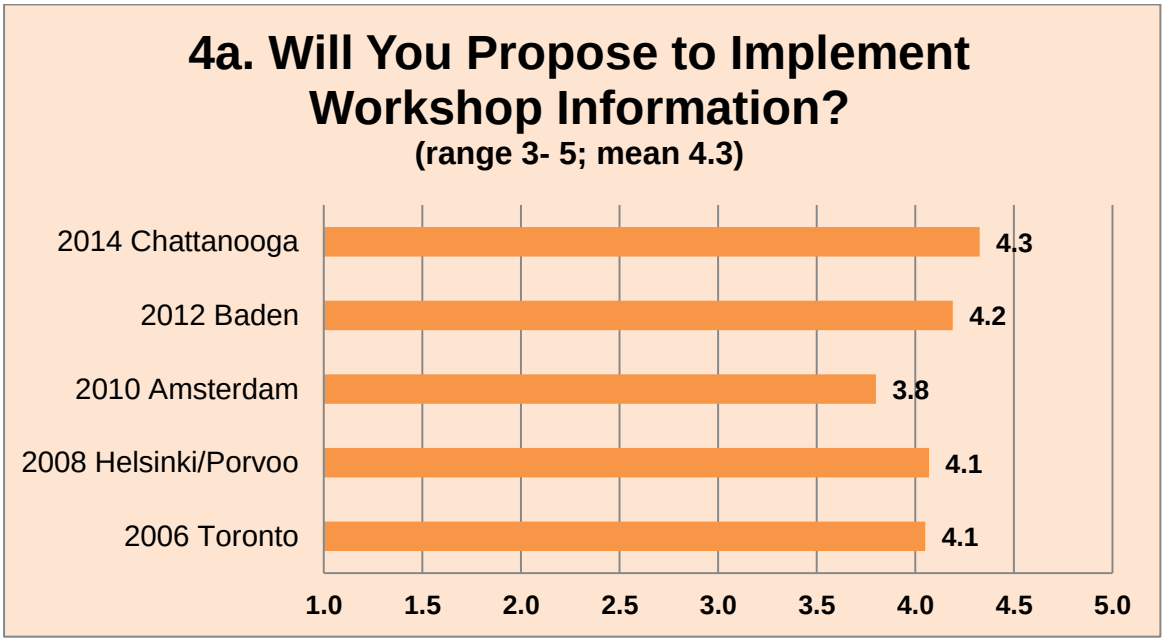
Each of the following charts depicts a specific objective of the workshop and the participant's responses on how well they were met.




2.0 Quality of Discussion on Contemporary Inspection Issues
(range 2 - 5; mean 4.3)
2014 Chattanooga
2012 Baden
2010 Amsterdam
2008 Helsinki/Porvoo
2006 Toronto
4.3
3.9
4.2
4.0
4.1
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


3.0 Development of Conclusions
(range 2 - 5; mean 4.2)
2014 Chattanooga
2012 Baden
2010 Amsterdam
2008 Helsinki/Porvoo
2006 Toronto
4.2
4.0
3.6
4.0
4.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


4.0 Identification of Inspection Methods
(range 2 - 5; mean 3.8)
2014 Chattanooga
2012 Baden
2010 Amsterdam
2008 Helsinki/Porvoo
2006 Toronto
3.8
3.7
3.5
3.8
3.7
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


4a. Will You Propose to Implement Workshop Information?
(range 3- 5; mean 4.3)
2014 Chattanooga
2012 Baden
2010 Amsterdam
2008 Helsinki/Porvoo
2006 Toronto
4.3
4.2
3.8
4.1
4.1
1.0
1.5
2.0
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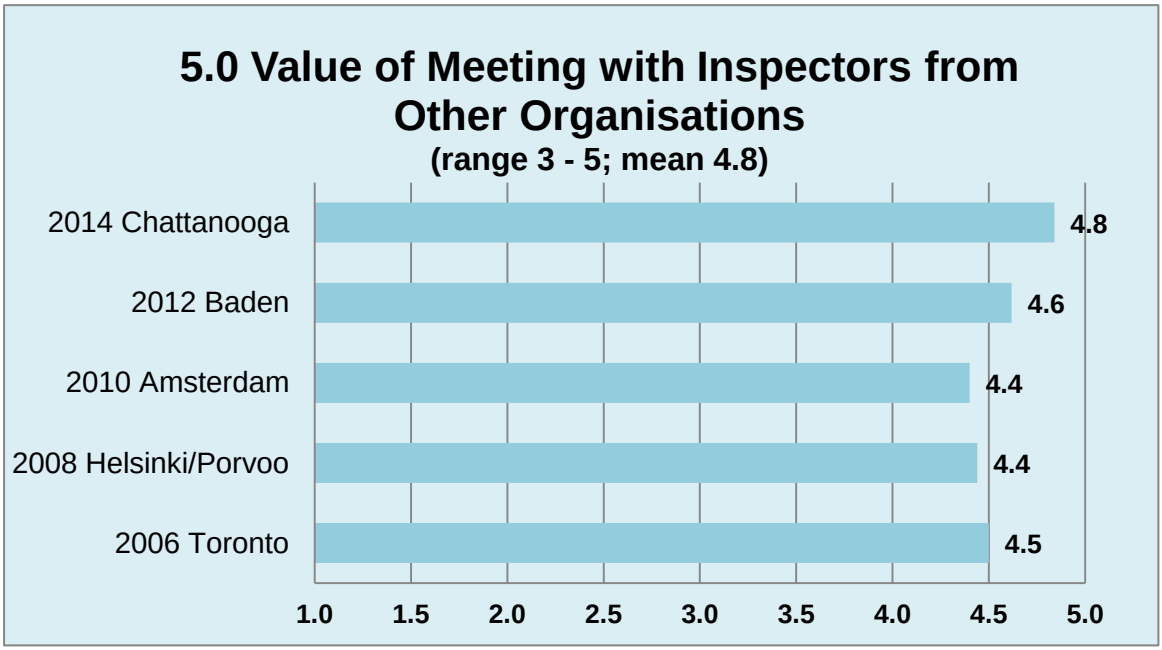
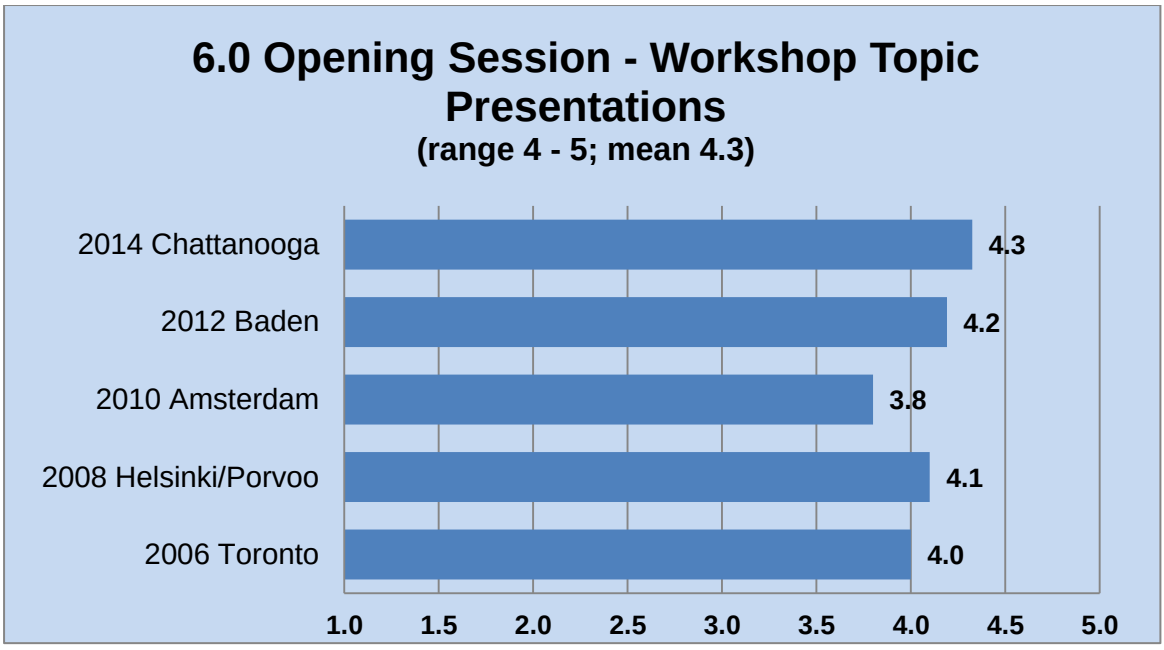
3.0
3.5
4.0
4.5
5.0

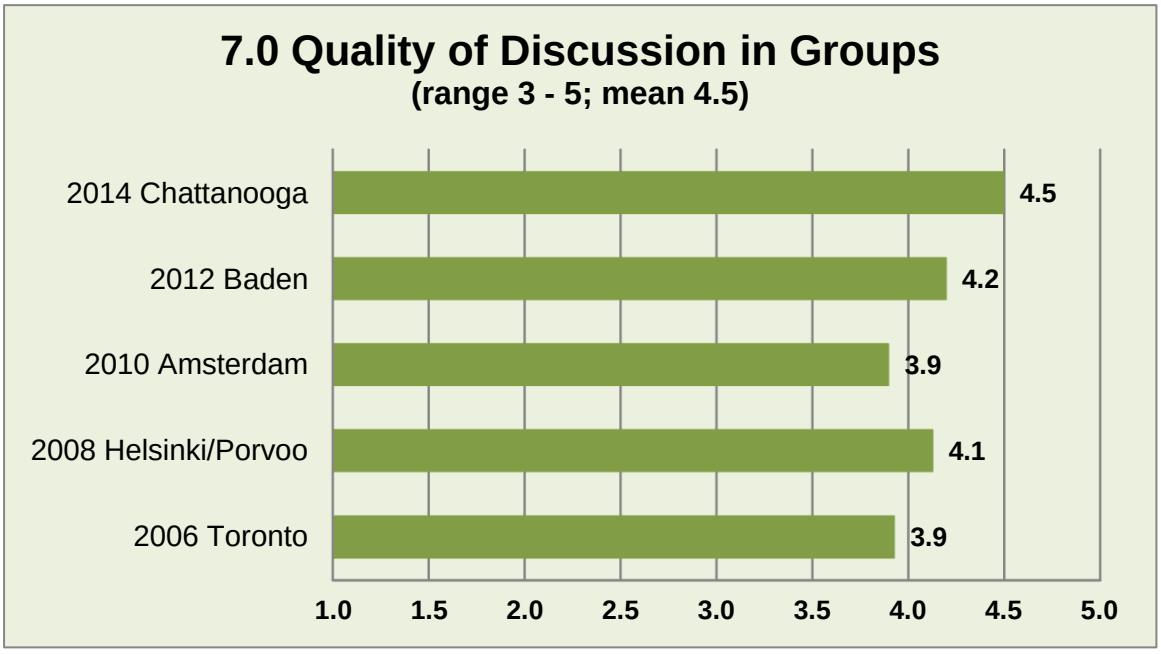


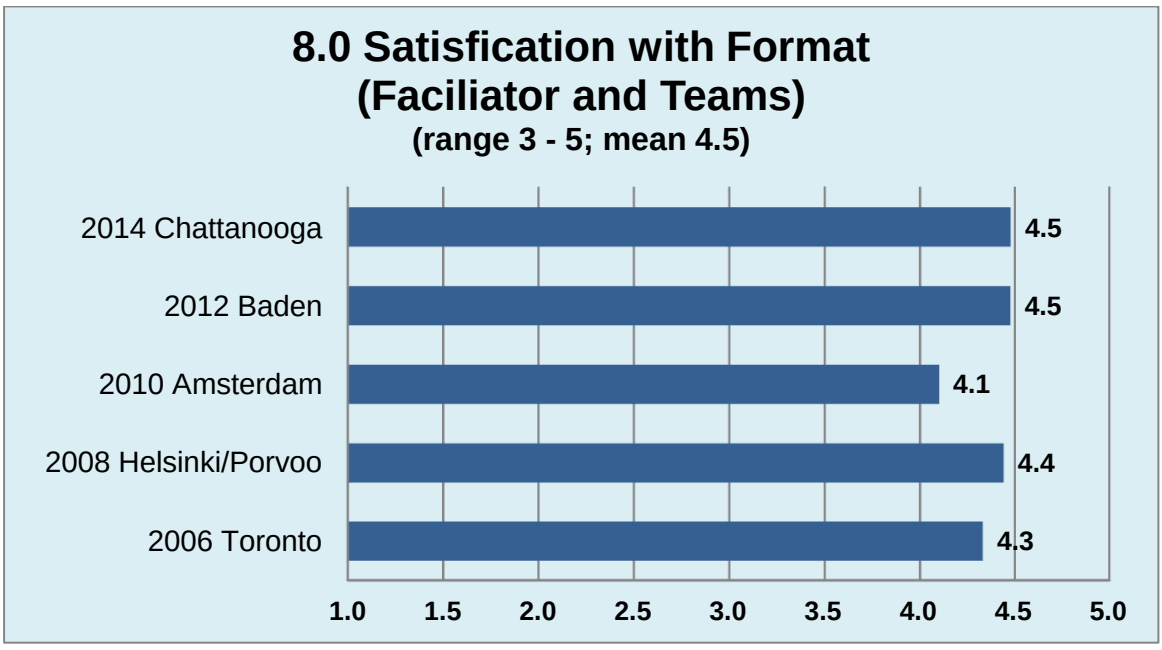
The results are comparable with last four Workshops, which reached the highest history rating in the most of these six specific objectives, when the responses to Questions 1, 2, 4, 4a and 5 show that not only do participants find the exchange of information valuable, but were able to identify issues and methods to use in improving their own inspection programmes.

Workshop Format

This part of the questionnaire looked at how effective each of the sessions was. The main objective of this question focuses on the way sessions are conducted. The responses provide key information to WGIP in their preparation and planning for future workshops.



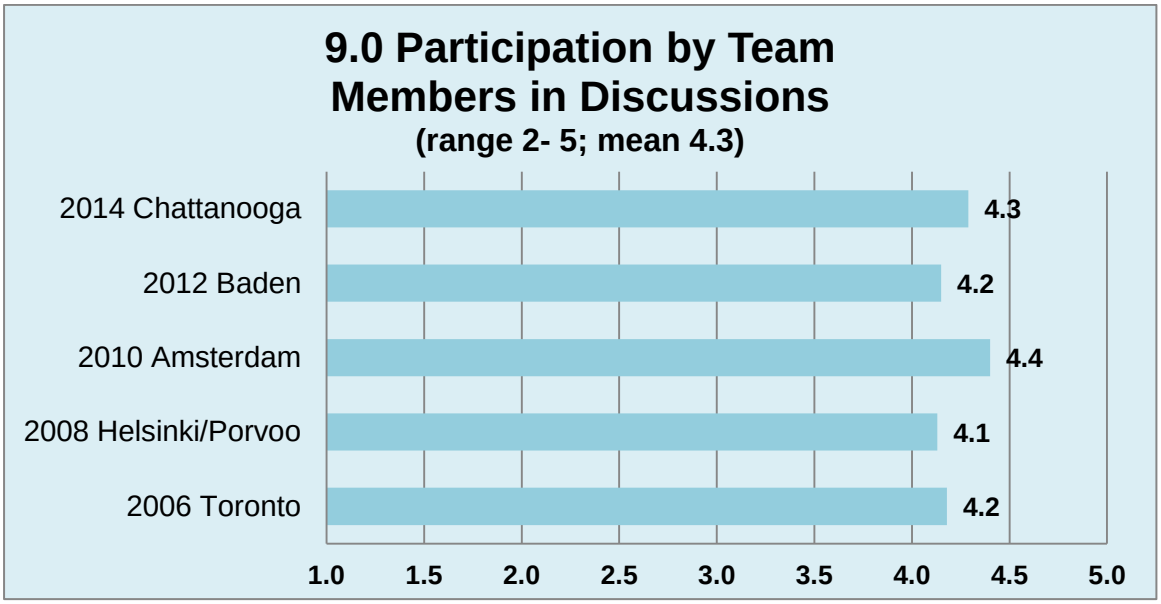


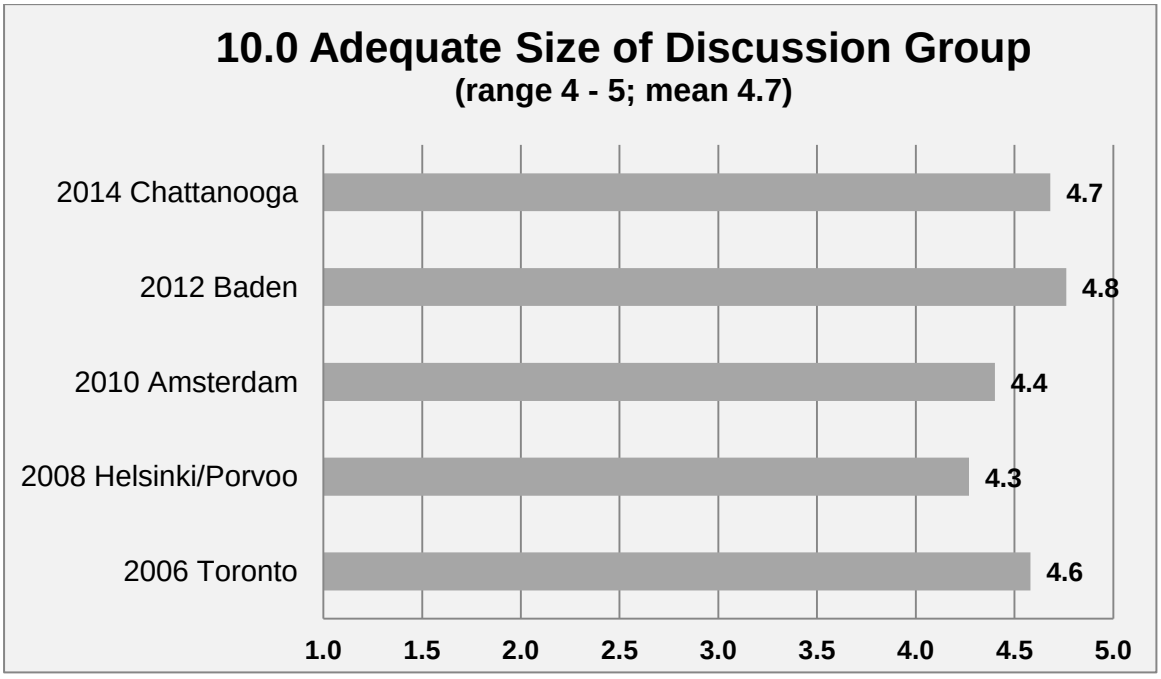


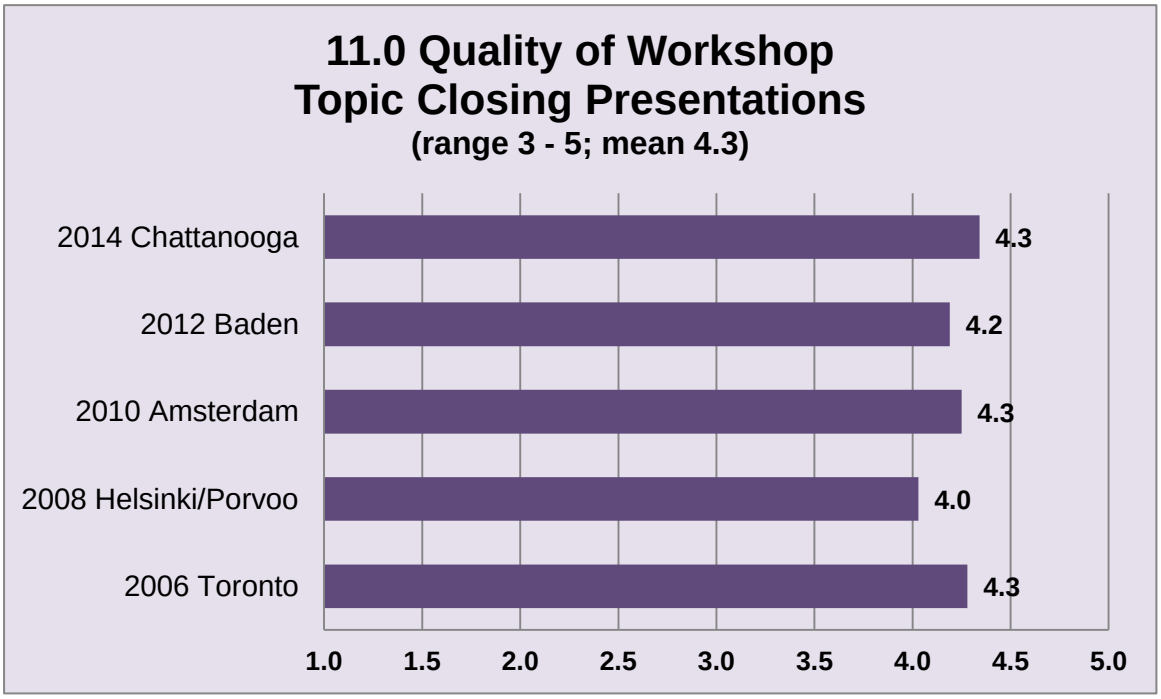
The results are again as in the previous areas among the best in all WGIP workshops history. They confirm that WGIP members have become more efficient in preparing and running the workshop. The success of each workshop is dependent on good preparation by the WGIP and coordination between the facilitators and recorders for each topic. As discussed in previous proceedings, social interaction outside the workshop sessions clearly enhances the discussions.

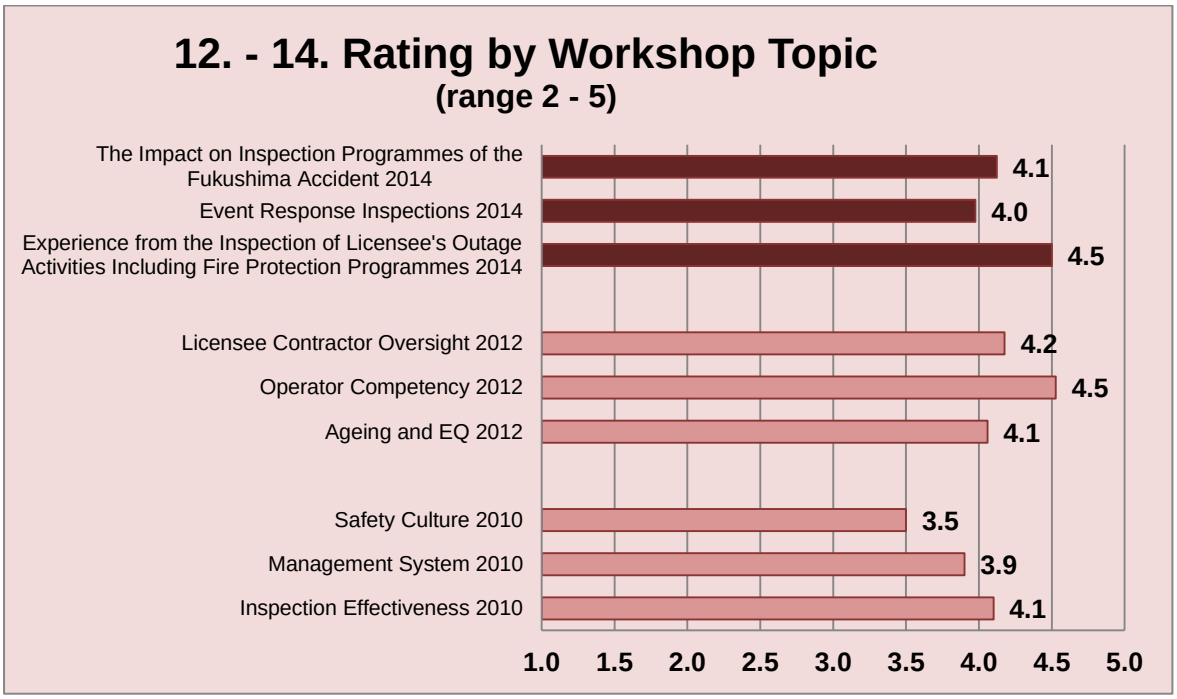
Workshop Topics

In order to assess how well the topics have been addressed, participants are asked to give a rating on whether they perceived the topics were covered adequately.





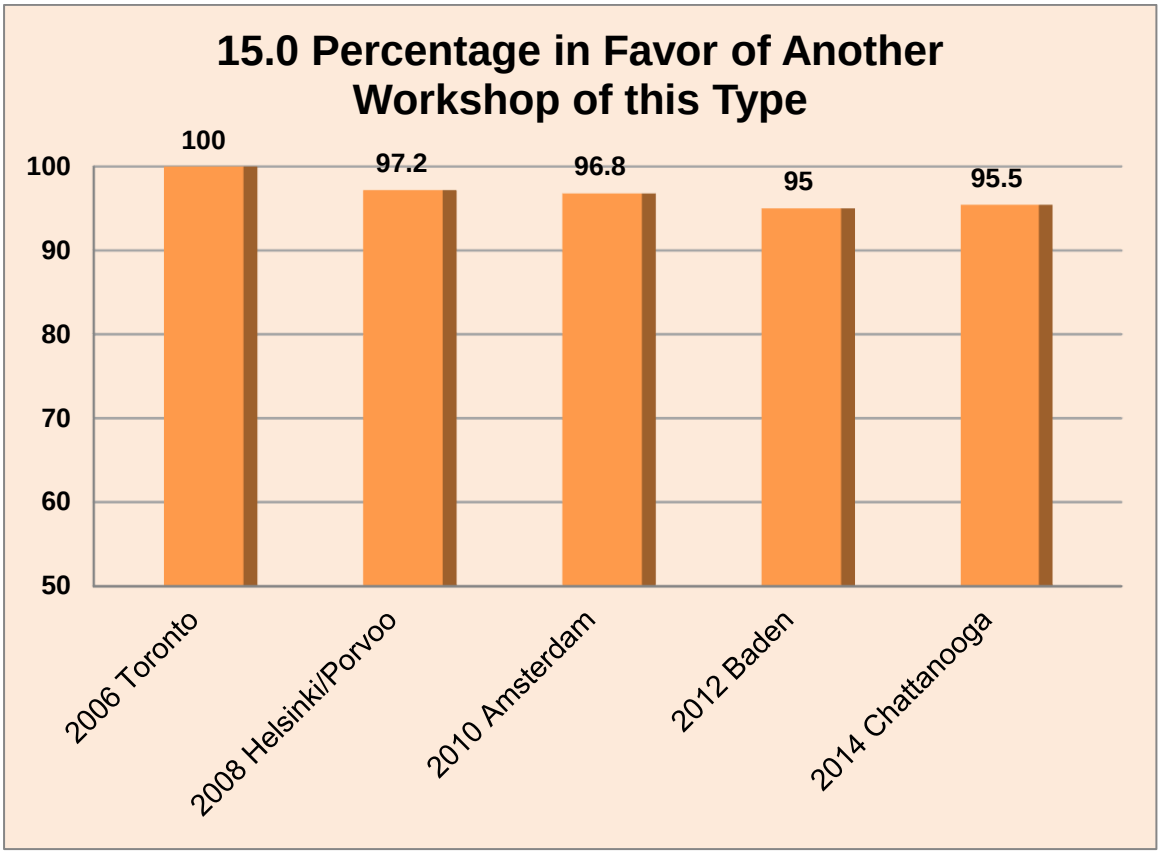


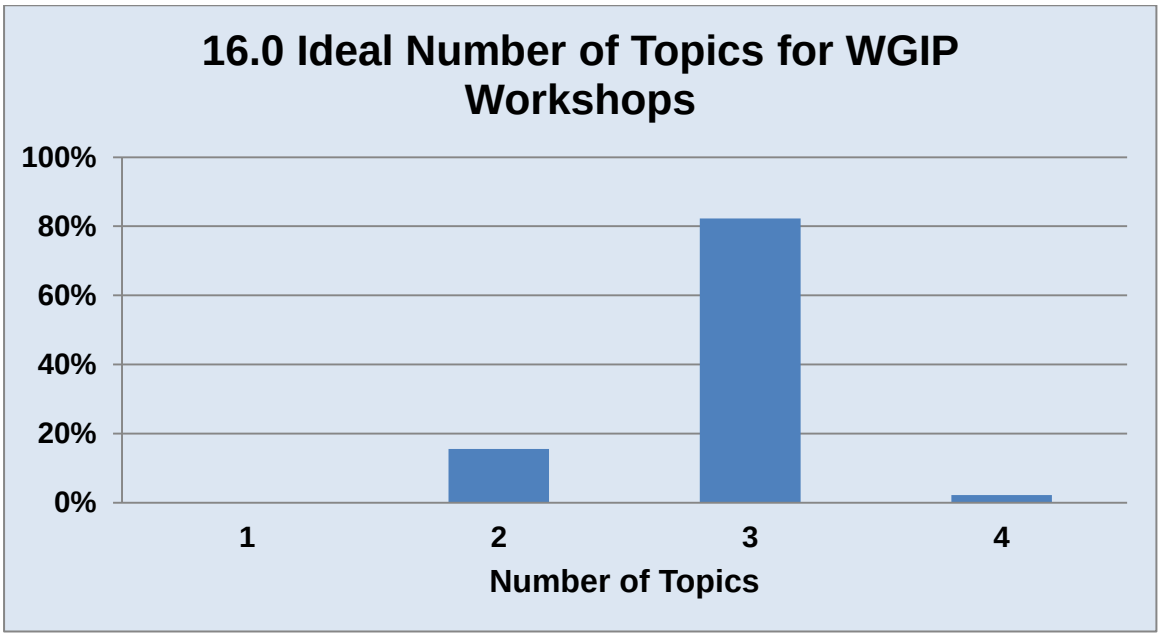


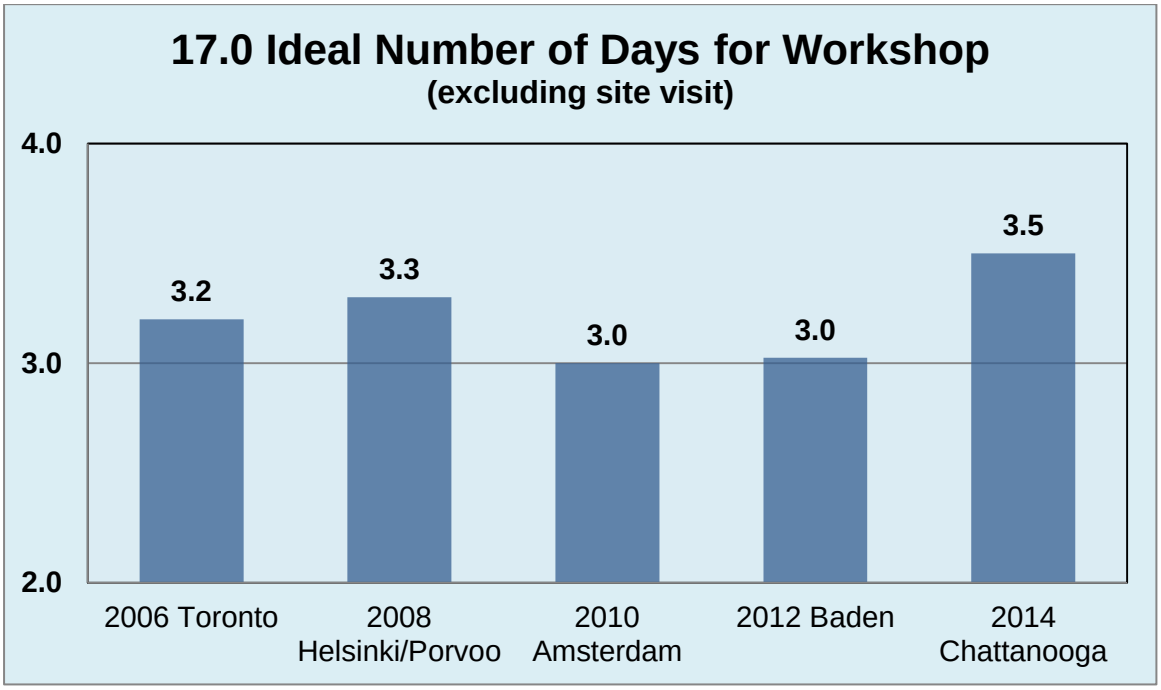
Workshop participants were generally satisfied with the selection of topics and how they were addressed. The scores recorded were similar to past workshops and the importance of outage inspections is clearly depicted.

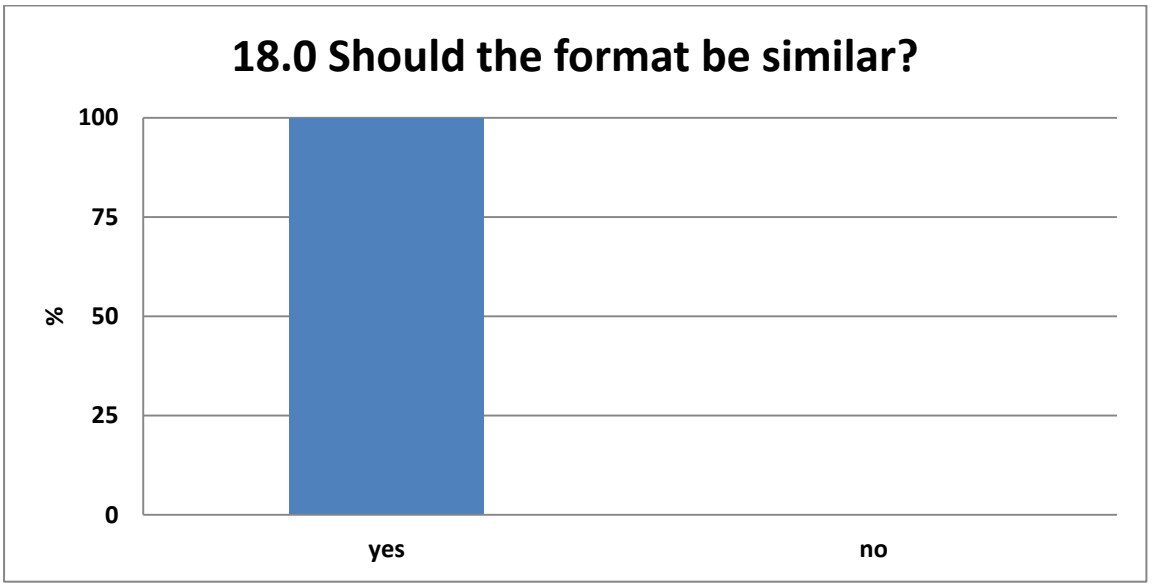
Future Workshops

This section provides a perspective of the type of format, the overall value of having workshops and how they can be improved in the future.









Workshop participants who responded showed strong support endorsing future workshops. The results show that most participants also agree with the existing format regarding the number of topics and the length of the workshop

7.2 Suggested Future Topics

Participants were asked to provide their input on potential future topics. While no specific analysis was applied to the results, WGIP and the CNRA will evaluate these and use them in proposing topics for future workshops. The topics mentioned were as follows:

INSPECTION OF MODIFICATIONS:
Inspection of Plant Modifications
Post-Fukushima Modification Inspections
Inspection of changes in the plant
Inspection of Implementation of Modifications
Inspection Practices for Modifications
Inspection of major maintenance activities or component replacement (e.g. vessel head, steam generators)
Modifications Implementation

Risk Themes:
Risk Analysis of events and conditions
PRA in inspection planning
Significance Determinations
Inspecting/implementing risk

INES:
INES Reporting
Use of INES rating

Decommissioning Inspections:
Inspection on plants during decommissioning
Decommissioning Inspections
Decommissioning

Random topics:
Transfer phase between announcing shutdown of an NPP to decommissioning
Purchasing organisations (counterfeit items)
Public communications by inspectors to include relationships with local officials
Monitoring plant status
Maintenance planning/execution inspections
How do RBs achieve improvements?
Training of Inspectors
Planned vs. Reactive inspections
Inspection of pumps and breakers
Standards for Inspections
Standards for inspection qualification
Quality Assurance
Dedication Process
Radiation Protection
Engineering Support for Operations
Reactor Engineering
Emergency Preparedness
Operating Experience Feedback
Training

Transport
Enforcement
Decision making related to safety
CAP system
Interface security and safety
Inspection during construction of new NPP units

Topics that have already been a subject of past WGIP workshops:
Aging management
Inspection/observing Safety Culture
Management System Inspections
Aging active components inspections
Inspection of Safety Culture
Inspection of Operating Management
Inspection of Organisational Factors
Safety Culture
Inspection of Organisation Changes
Management and quality assurance system

Additional Comments Received:

General:
There were really no overall conclusion from the workshop (question 3)- --that said, I do not think it was ever the goal.

Great opportunity to meet inspectors from other countries. Very valuable to obtain different perspectives.

Workshop Format:
For leads some prepared hints for working methods could be established by WGIP.
More time need to prepared slideshows and discuss/finalise with groups.
A prescribed structure for the discussions with objectives ----our group got a little off track.
Consistent format for closing presentations is needed.
Format was very logical and was a good approach.
It's ok.

Workshop Topics:
Event response may have been too broad a topic. Recommend narrowing topic to specific aspects for further discussion.
SDP discussion was excellent and very thorough.
I think with topic, two topics were put together which should have been treated separately.
Recognizing the value of simply writing in paper a consensus among participants, my impression is that some of the topics could have been addressed deeper.
Ok.

Other Comments:
Wednesday dinner much preferred.
Some additional time for closing preparation would be helpful.
Good group activities (baseball game, dinner, training centre visit).
Continental breakfast was quite poor.
Great job. This was very informative and enjoyable.
The workshop frequently asks inspectors to answer questions that should be addressed at higher levels.

8. LIST OF PARTICIPANTS

BELGIUM

ASSELBERGHS, Dirk	Bel V
BARRAS, Pierre	Bel V

CANADA

CHAN, Carol	Canadian Nuclear Safety Commission
DAVIS, Heather	Canadian Nuclear Safety Commission
KARKOUR, Suzanne	Canadian Nuclear Safety Commission
LEBLANC, Alexandre	Canadian Nuclear Safety Commission
LEMAY, Michel	Canadian Nuclear Safety Commission
MCFARLAN, Chad	Canadian Nuclear Safety Commission
ST. MICHAEL, Peter	Canadian Nuclear Safety Commission

CZECH REPUBLIC

JAKES, Miroslav	State Office for Nuclear Safety
TIPEK, Zdeněk	State Office for Nuclear Safety

FINLAND

HEIKKILA, Jan	Radiation and Nuclear Safety Authority
KUPILA, Jukka	Radiation and Nuclear Safety Authority

FRANCE

CAYLA, Jean-Pierre	Autorité de Sûreté Nucléaire (ASN)
NATAF, Michael	Autorité de Sûreté Nucléaire (ASN)
VEYRET, Olivier	Autorité de Sûreté Nucléaire (ASN)

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FORELL, Burkhard	Gesellschaft für Anlagen- und Reaktorsicherheit GRS mbH
GLÖCKLE, Walter	Ministry of the Environment Baden Württemberg (UM BW)
SCHEIB, Patric	Ministry of the Environment Baden Württemberg (UM BW)
SCHNEIDER, Matthias	Bundesamt für Strahlenschutz Fachbereich Sicherheit in der Kerntechnik
WANKE, Stephan	Ministry of the Environment Baden Württemberg (UM BW)

INDIA

GARG, Arvind Paul	Atomic Energy Regulatory Board (AERB)

JAPAN

KOIZUMI, Hiroyoshi	Japan Nuclear Energy Safety Organisation

KOREA (REPUBLIC OF)

BAE, Young Bum	Korea Institute of Nuclear Safety (KINS)
LEE, Durk Hun	Korea Institute of Nuclear Safety (KINS)
LEE, Chang Ju	Korea Institute of Nuclear Safety (KINS)

MEXICO

GOMEZ_MONTERRUBIO, Raymundo	Comision Nacional de Seg Nuclear y Salvaguardias (CNSNS)
HERNANDEZ MALDONADO, Antonio	Comision Nacional de Seg Nuclear y Salvaguardias (CNSNS)

POLAND

DABROWSKI, Marcin	National Atomic Energy Agency (PAA)
GLOWACKI, Andrzej	National Atomic Energy Agency (PAA)

RUSSIAN FEDERATION

KHLABYSTOV, Sergey	Rostechnadzor

SLOVAK REPUBLIC

MELICHAREK, Michal	Nuclear Regulatory Authority of the Slovak Republic/Urad jadroveho dozoru Slovenskej (UJD)

SLOVENIA

SAVLI, Sebastjan	Slovenian Nuclear Safety Administration

SPAIN

CRESPO, Julio	Consejo de Seguridad Nuclear (CSN)
GARCIA, Carlos	Consejo de Seguridad Nuclear (CSN)

SWEDEN

HAGG, Per-Olof	Swedish Radiation Safety Authority
KOZARCANIN, Adnan	Swedish Radiation Safety Authority
SORDAL, Stefan	Swedish Radiation Safety Authority

SWITZERLAND

FIERZ, Hans Rudolf	Swiss Federal Nuclear Safety Inspectorate (ENSI)

UNITED KINGDOM

ARCHER, Bruce	Office for Nuclear Regulation
THOMAS, Graeme	Office for Nuclear Regulation

UNITED STATES OF AMERICA

BROWN, Tony	Nuclear Regulatory Commission
CAIN, Loyd	Nuclear Regulatory Commission
CAMPBELL, Steve	Nuclear Regulatory Commission
GAMBERONI, Marsha	Nuclear Regulatory Commission
NOGGLE, Jim	Nuclear Regulatory Commission
REGAN, Christopher	Nuclear Regulatory Commission
ROACH, Gregory	Nuclear Regulatory Commission
WERKHEISER, David	Nuclear Regulatory Commission

International Organisations

KOBETZ, Timothy	IAEA
SALGADO, Nancy	Nuclear Energy Agency

9. PREVIOUS WGIP REPORTS

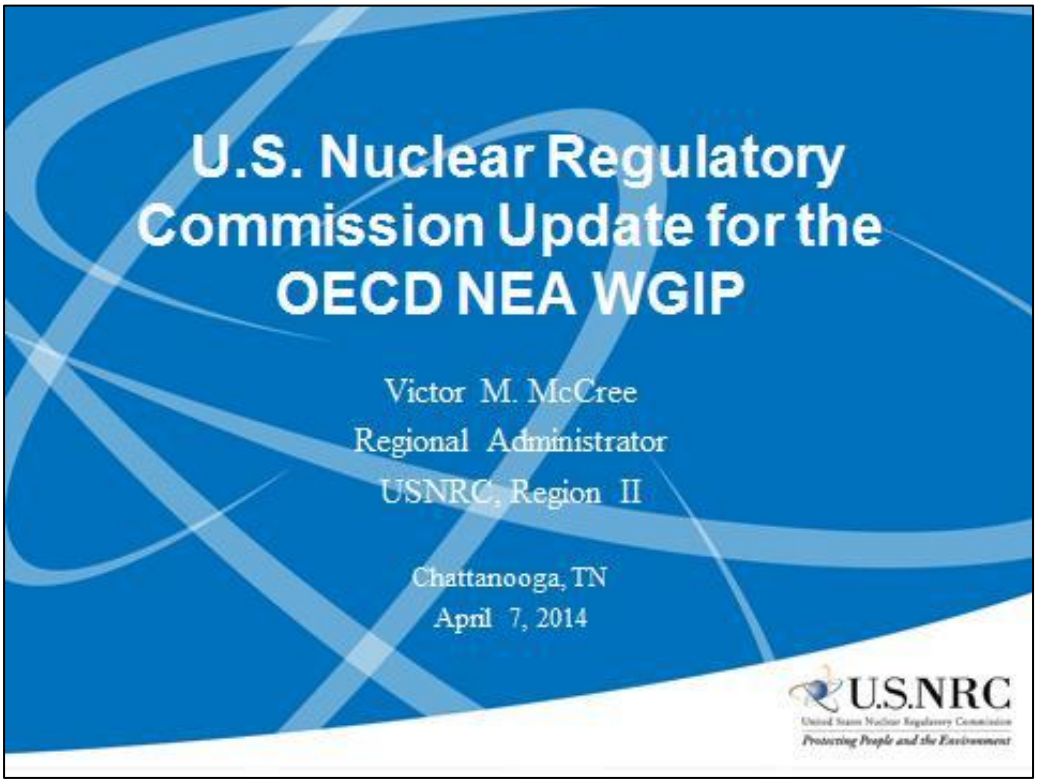
CNRA are reports available to download for free at: www.oecd-nea.org/nsd/docs/indexcnra.htmls

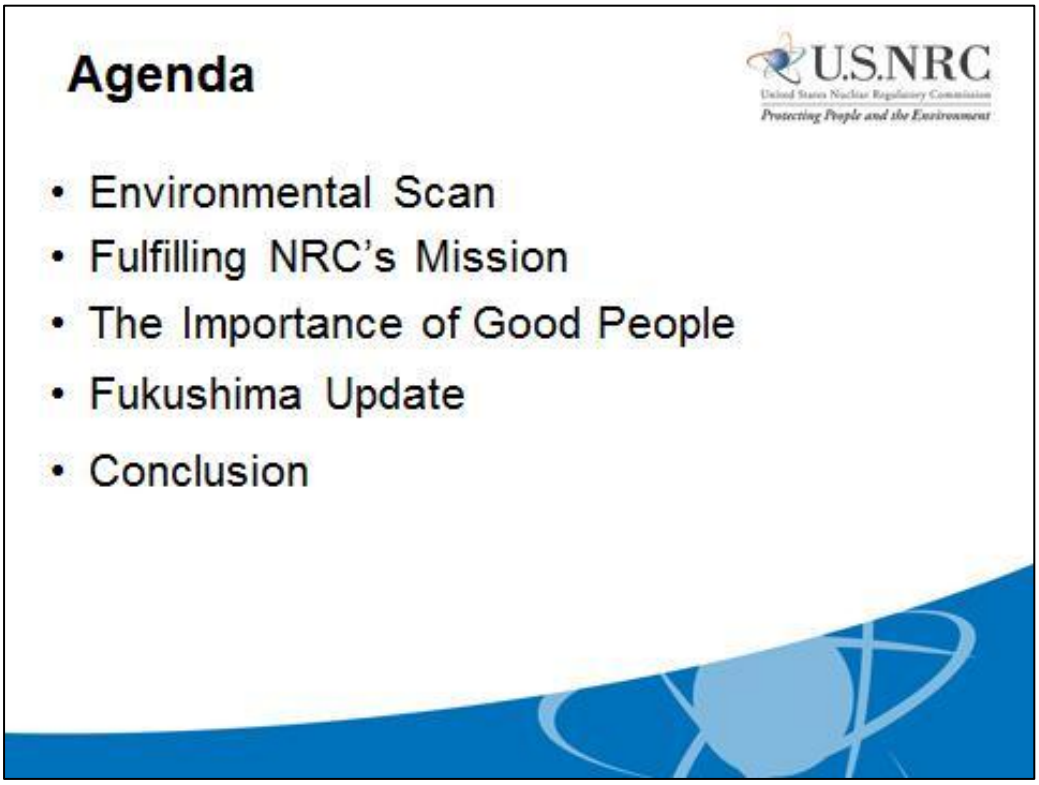
- Inspection of Emergency Arrangements [NEA/CNRA/R(2013)2]
- Inspection of Licensee – Maintenance Programme and Activities [NEA/CNRA/R(2013)1]
- Proceedings of the Eleventh International Nuclear Regulatory Inspection Workshop on Experience from the Inspection of Ageing and Equipment Qualification of Competency of Operators and of Licensee's Oversight of Contractors – Baden, Switzerland, 21-24 May 2012 [NEA/CNRA/R(2012)6]; Appendix: Compilation of Survey Responses [NEA/CNRA/R(2012)6/ADD1]
- Proceedings of the International Operating Experience on Utilisation of Operating Experience in the Regulatory Inspection Programme and of Inspection Findings in the National Operating Experience Programme and Operating Experience and Inspection Insights from the Non-conformance of Spare Parts – Helsinki, Finland, 14-16 June 2011 [NEA/CNRA/R(2012)3]; Appendix (Compilation of Survey Responses) [NEA/CNRA/R(2012)3/ADD1]
- Proceedings of the Tenth International Nuclear Regulatory Inspection Workshop on Experience from Inspecting Safety Culture, Inspection of Licensee Safety Management System and Effectiveness of Regulator Inspection Process – Amsterdam, the Netherlands, 17-19 May 2010 [NEA/CNRA/R(2010)5]; Appendix of responses [NEA/CNRA/R(2010)6]
- Inspection of Licensee's Corrective Action Programme [NEA/CNRA/R(2010)7]
- Proceedings of the Ninth International Nuclear Regulatory Inspection Workshop on Training and Qualification of Inspectors, Integration of Inspection Findings and Inspections of New Plants Under Construction, Porvoo, Finland, 1-5 June 2008 [NEA/CNRA/R(2010)1]; Appendix (Compilation of Survey Responses) NEA/CNRA/R(2010)2
- Fire Inspection Programmes [NEA/CNRA/R(2009)1]
- Proceedings of the CNRA Workshop on Inspection of Digital I&C System: Methods and Approaches, Garching, Germany, 24-26 September 2007 [NEA/CNRA/R(2008)6]
- Proceedings of the Eighth International Nuclear Regulatory Inspection Workshop on How Regulatory Inspections Can Promote or Not Promote Good Safety Culture, Inspection of Interactions Between the Licensee and Its Contractors, and Future Challenges for Inspectors – Toronto, Canada, 1-3 May 2006 [NEA/CNRA/R(2007)1]; Appendix – Compilation of Survey Responses [NEA/CNRA/R(2007)2]
- Regulatory Inspection Practices to Bring About Compliance [NEA/CNRA/R(2005)1]
- Proceedings of the Workshop on Risk-Informed Inspection, Inspection of Performance of Licensee Organisation, and Inspection Aspects of Plants Near or at End-of-Life – Fekete-Hegy, Hungary, 26-29 April, 2004 [NEA/CNRA/R(2005)4]; Appendix – Compilation of Survey Responses [NEA/CNRA/R(2005)5]
- Comparison of Inspection Practices of Research Reactors in Relation to the Practices Carried Out at Nuclear Power Plants [NEA/CNRA/R(2004)1]
- Proceedings of the Workshop on Regulatory Inspection Activities Related to Inspection of Events and Incidents, Inspection of Internal and External Hazards and Inspection Activities Related to Challenges Arising from Competition in the Electricity Market – Veracruz, Mexico, 28 April-2

May 2002 [NEA/CNRA/R(2003)1]; Appendix - Compilation of Survey Responses [NEA/CNRA/R(2003)2]

- Inspection of Fuel Cycle Facilities in NEA Member Countries [NEA/CNRA/R(2003)3]
- Nuclear Regulatory Inspection of Contracted Work Survey Results [NEA/CNRA/R(2003)4]
- Proceedings of the Workshop on Regulatory Inspection Activities related to Radiation Protection, Long Shutdowns and Subsequent restarts, and the Use of Objective Indicators in Evaluating the Performance of Plants – Baltimore, MD, USA 15-17 May 2000 [NEA/CNRA/R(2001)4]; Appendix [NEA/CNRA/R(2001)5]
- Inspection of Maintenance on safety Systems During NPP Operation [NEA/CNRA/R(2001)6]
- The Effectiveness of Nuclear Regulatory Inspection [NEA/CNRA/R(2001)7]
- The Effectiveness of Licensees in Inspecting the Management of Safety [NEA/CNRA/R(2001)9]
- Status Report on Regulatory Inspection Philosophy, Inspection Organisation and Inspection Practices [NEA/CNRA/R(2001)8]; Paris, 1994 [NEA/CNRA/R(94)3]; Paris, 1997 [NEA/CNRA/R(97)3; also OECD/GD(97)140]
- Commendable Practices for Regulatory Inspection Activities [NEA/CNRA/R(2000)2]
- Regulatory Practices for the Decommissioning of Nuclear Facilities with Special Regard to Regulatory Inspection Practices [NEA/CNRA/R(99)4]
- Proceedings of the Workshop on Regulatory Inspection Practices Related to Older Operating NPPs, Risk Evaluation and Licensee Resource Commitment, Prague, Czech Republic, 8-11 June 1998 [NEA/CNRA/R(99)2]
- Comparison of the Inspection Practices in Relation to the Control Room Operator and Shift Supervisor Licenses [NEA/CNRA/R(98)1]
- Inspection of Licensee Activities in Emergency Planning [NEA/CNRA/R(98)2]
- Performance Indicators and Combining Assessments to Evaluate the Safety Performance of Licensees [NEA/CNRA/R(1998)3]
- Regulatory Inspection Practices on Fuel Elements and Core Lay-out at NPPs [NEA/CNRA/R(97)4]
- Proceedings of an International Workshop on Regulatory Inspection Activities related to Inspection Planning, Plant Maintenance and Assessment of Safety – Chester, United Kingdom, 19-23 May 1996 [NEA/CNRA/R(97)1; also OECD/GD(97)62]
- Inspector Qualification Guidelines [NEA/CNRA/R(94)1]
- Conduct of Inspections for Plant Modifications, Event Investigations and Operability Decisions, Proceedings of an International WGIP-Workshop Helsinki, 23-25 May 1994 [NEA/CNRA/R(94)4 – OECD/GD(95)14]
- Proceedings of the International Workshop on Conduct of Inspections and Inspector Qualification and Training – Chattanooga, Tennessee, 31 August-3 September 1992 [NUREG/CP-0128; also NEA/CNRA/R(92)3]
- Proceedings of the CSNI Specialist Meeting on Operating Experience Relating to On-site Electronic Power Sources – London, United Kingdom, 16-18 October 1985 [No. 115, February 1996]

10. WORKSHOP OPENING PRESENTATION


U.S. Nuclear Regulatory Commission Update for the OECD NEA WGIP
Victor M. McCree
Regional Administrator
USNRC, Region II
Chattanooga, TN
April 7, 2014
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment


Agenda
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
• Environmental Scan
• Fulfilling NRC's Mission
• The Importance of Good People
• Fukushima Update
• Conclusion

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Environmental Scan

The Commission

Chairman Allison M. Macfarlane | Commissioner Kristine L. Svinicki | Commissioner George Apostolakis | Commissioner William D. Magwood | Commissioner William C. Ostendorff

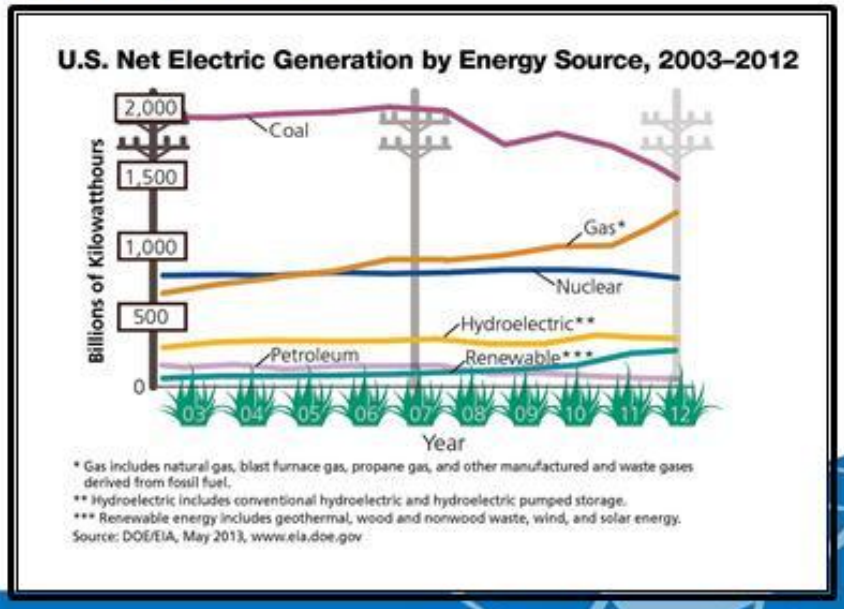
NRC Budget

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- FY14 Budget (Approved)
  - Approximately $1B
  - Over 3800 FTE
- FY15 (Request)
  - Approximately $1B
  - Over 3800 FTE
- FY16 (Under Development)

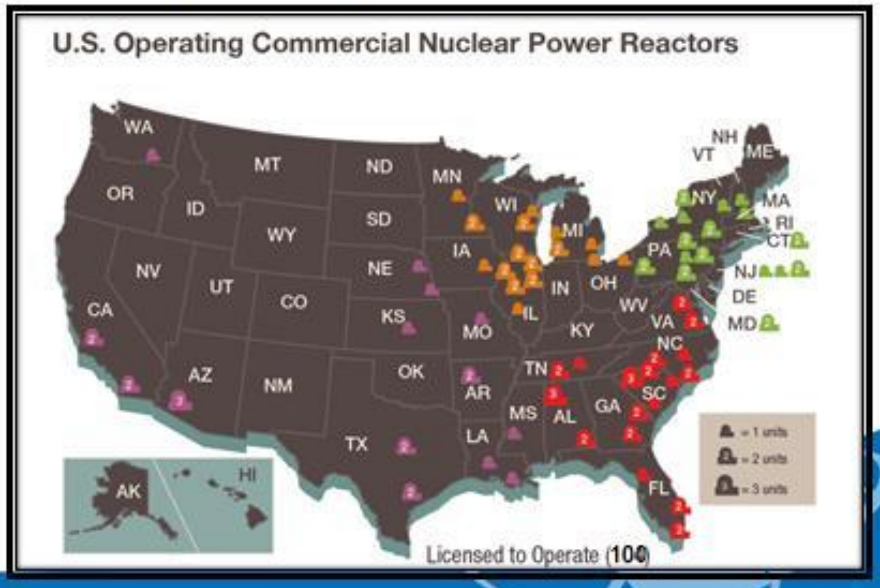
Current Status of U.S. Nuclear Power: Generation

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Current Status of U.S. Nuclear Power: Operating Reactors

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

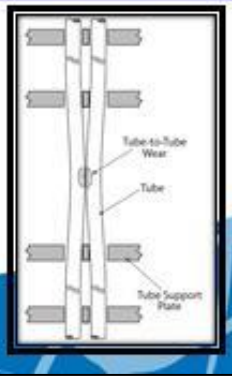


Current Status of U.S. Nuclear Power: Operating Reactors

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Material Issues

Crystal River 3	San Onofre Units 2 and 3
Containment Building Concrete Delamination	Steam Generator Tube Degradation
1 PWR, produced 860 MW	2 PWRs, produced 2,150 MW



Current Status of U.S. Nuclear Power: Operating Reactors

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Market Conditions

Kewaunee	Vermont Yankee
(1) No Economies of Scale (2) Timing for Renewal of Power Purchase Agreements	(1) Low Natural Gas Prices (2) High Cost Structure (3) Wholesale Market Design Flaws
1 PWR reactor, produced 556 MW	1 BWR reactor, produces 605 MW

Future of U.S. Nuclear Power: Cost

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

"Of all factors affecting prospects for the substantial growth of nuclear power in the 21st century, cost is the most fundamental."

World Nuclear Association, *The New Economics of Nuclear Power*

Current Status of U.S. Nuclear Power: New Construction

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Current Status of U.S. New Reactor Construction

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Plant Vogtle 3 and 4 Construction Site, Unit 3


Current Status of U.S. New Reactor Construction
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
V.C. Summer Unit 3

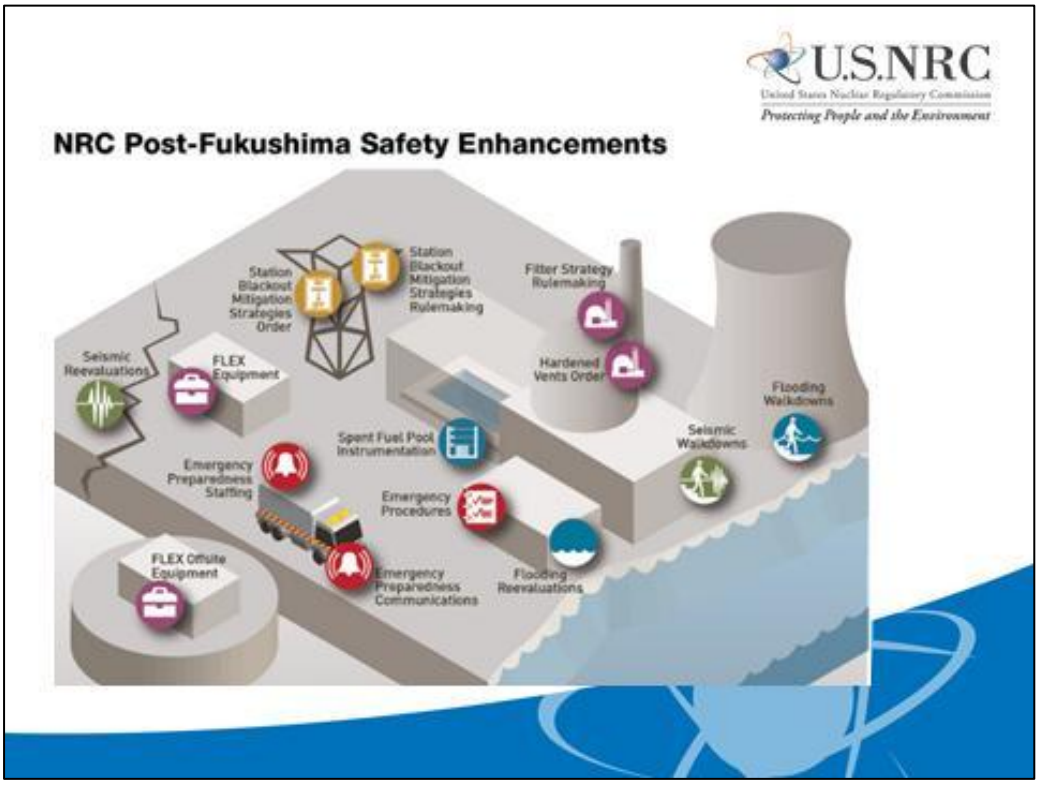

Fulfilling NRC's Mission
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
Safety
Security
Environment


Fulfilling NRC's Mission
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
• Safety Matters
• 2013 ROP Results
• Focus Areas
- Flooding
- Program Implementation
- Maintenance Rule
- Commercial Grade Dedication
- Corrective Action Program
15


Fulfilling NRC's Mission
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
• Major Areas of International Engagement
- International Treaties and Conventions
- Export and Import Licensing
- Cooperation and Assistance
- Research Cooperation
16


Importance of Good People
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
• Expertise in High Reliability Organizations
• Knowledge is Key to Defense in Depth
• Wisdom Enables Regulatory Credibility
• People Are Our Most Important Asset
17

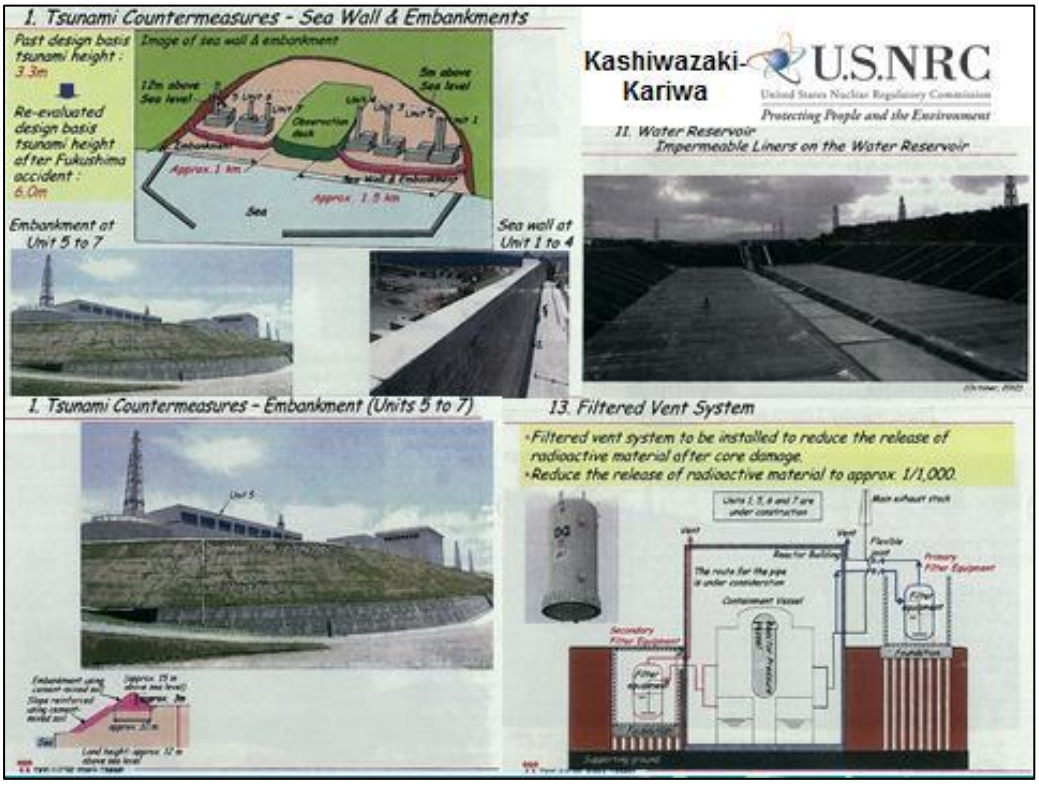

Effective Communications
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
• Expertise in High Reliability Organizations
• Knowledge is Key to Defense in Depth
• Wisdom Enables Regulatory Credibility
• People Are Our Most Important Asset
18

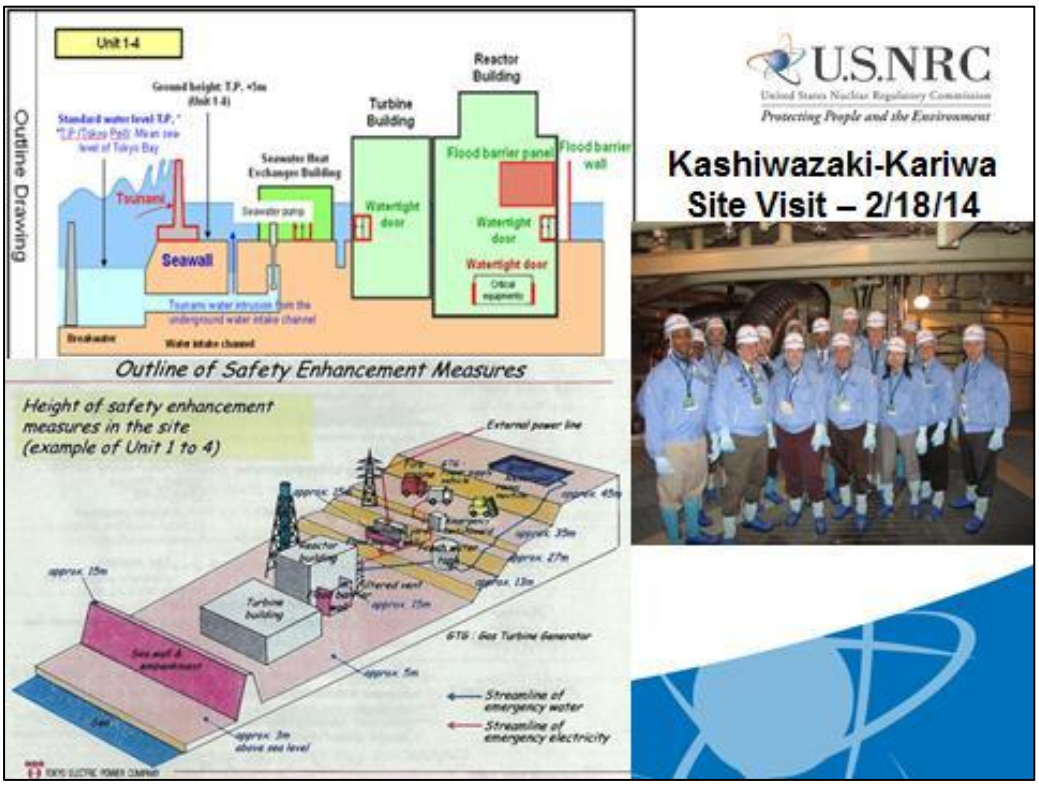

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
NRC Post-Fukushima Safety Enhancements
Station Blackout Mitigation Strategies Order
Station Blackout Mitigation Strategies Rulemaking
Filter Strategy Rulemaking
Seismic Reevaluations
FLEX Equipment
Hardened Vents Order
Flooding Walkdowns
Spent Fuel Pool Instrumentation
Seismic Walkdowns
Emergency Preparedness Staffing
Emergency Procedures
FLEX Offsite Equipment
Emergency Preparedness Communications
Flooding Reevaluations


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
NRC/JANSI Meeting
2/19/14


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
NRC/JNRA Meeting
2/19/14


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
The Sea of Japan
Kashiwazaki-Kariwa
Nuclear Power Station
Fukushima-Daiichi
Nuclear Power Station
Fukushima-Daini
Nuclear Power Station
Pacific Ocean


1. Tsunami Countermeasures - Sea Wall & Embankments
Past design basis tsunami height : 3.3m
Re-evaluated design basis tsunami height after Fukushima accident : 6.0m
Image of sea wall & embankment
Embankment at Unit 5 to 7
Sea wall at Unit 1 to 4
Kashiwazaki-Kariwa
U.S.NRC
Protecting People and the Environment
11. Water Reservoir
Impermeable Liners on the Water Reservoir
1. Tsunami Countermeasures - Embankment (Units 5 to 7)
13. Filtered Vent System
•Filtered vent system to be installed to reduce the release of radioactive material after core damage.
•Reduce the release of radioactive material to approx. 1/1,000.


Outline Drawing
Unit 1-4
Reactor Building
Turbine Building
Seawater Heat Exchanger Building
Flood barrier panel
Flood barrier wall
Watertight door
Tsunami
Seawall
U.S.NRC
Protecting People and the Environment
Kashiwazaki-Kariwa
Site Visit – 2/18/14
Outline of Safety Enhancement Measures
Height of safety enhancement measures in the site (example of Unit 1 to 4)
External power line
Turbine building
GTG : Gas Turbine Generator
Streamline of emergency water
Streamline of emergency electricity


Hwy 6 between
Iwaki and
Fukushima
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment


Tomioka,
Japan
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

TEPCO Lessons Learned at Fukushima Daini

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Common Understanding of Plant Conditions
  - Leaders must lead; align on what is known and unknown
- Ensure adequate Onsite Licensee Staffing
  - Maintenance and ER
- Onsite Prevention/Mitigation Equipment
  - Infrastructure damage may prevent site access
- Handling Emotional Needs of Personnel


Fukushima Daiichi – Prior to March 11, 2011
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
1
2
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4
5
6


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
Fukushima Daiichi
Site Visit – 2/21/14


U.S.NRC
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Fukushima Daiichi
Site Visit – 2/21/14


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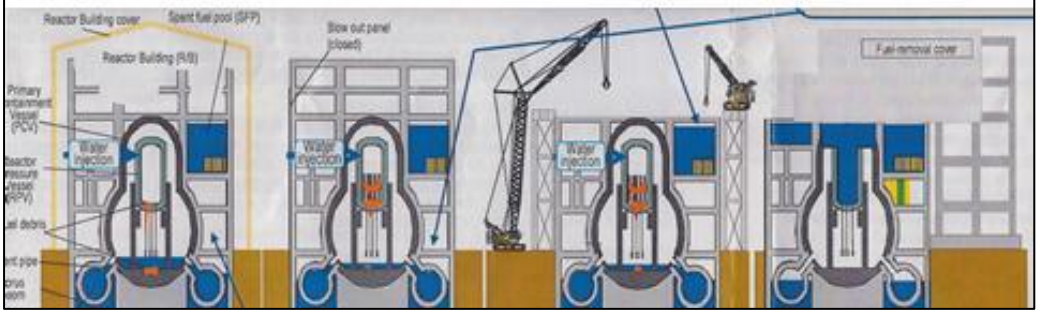
Fukushima Daiichi
Site Visit – 2/21/14

Fukushima Daiichi Current Status

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- ❑ Units 1 - 3 maintained in cold shutdown
- ❑ Site boundary rad level .03 mSv/yr (3 mrem/yr)
- ❑ Unit 4 spent fuel removal in progress
- ❑ Unit 3 SFP rubble removal in progress
- ❑ Frozen soil impermeable wall installation in progress
- ❑ Multi-nuclide removal for water decontamination
- ❑ 3D laser scan data collection for ultimate fuel debris removal



Fukushima Daiichi

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

"The impact of the tsunami was totally bigger than what we expected, trained, prepared for, or believed was possible— it was unimaginable. We must always be prepared for the possibility that something much bigger can happen."

Mr. Ikuo Izawa, Shift Manager,
Fukushima Daiichi Units 1/2

Major Lessons from Visit

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

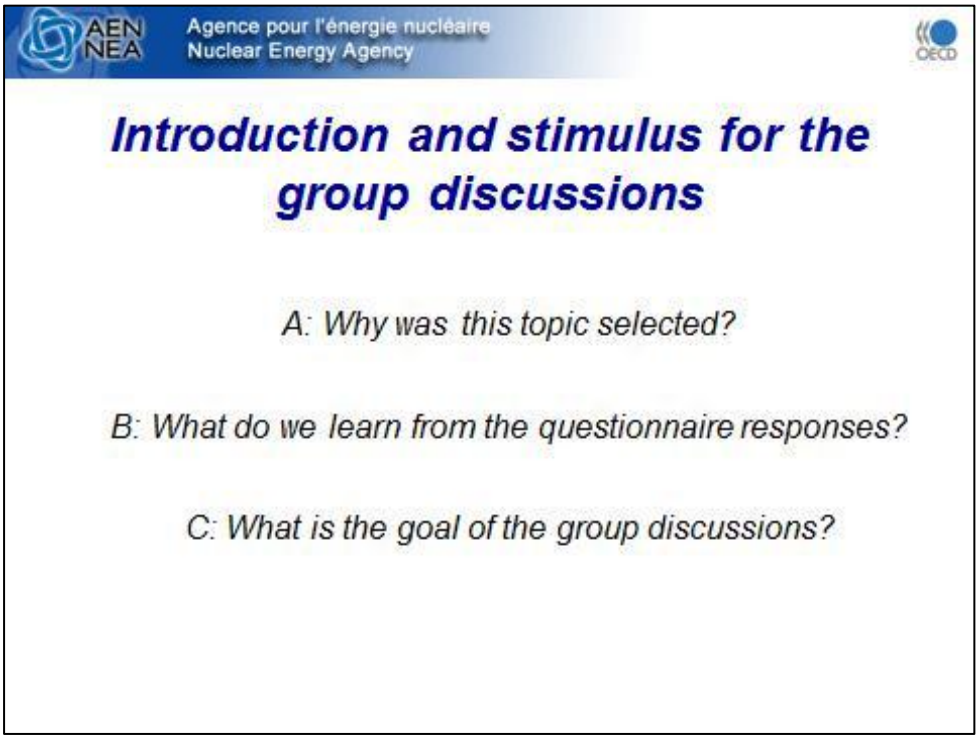
1. *Assure that the U.S. nuclear industry and the NRC are prepared for the unexpected.*
2. *Ensure that U.S. licensees fully implement, maintain, and appropriately exercise the measures associated with the post-Fukushima actions directed by the NRC.*
3. *NRC and industry need to maintain an appropriately deep level of technical expertise within our respective organizations.*

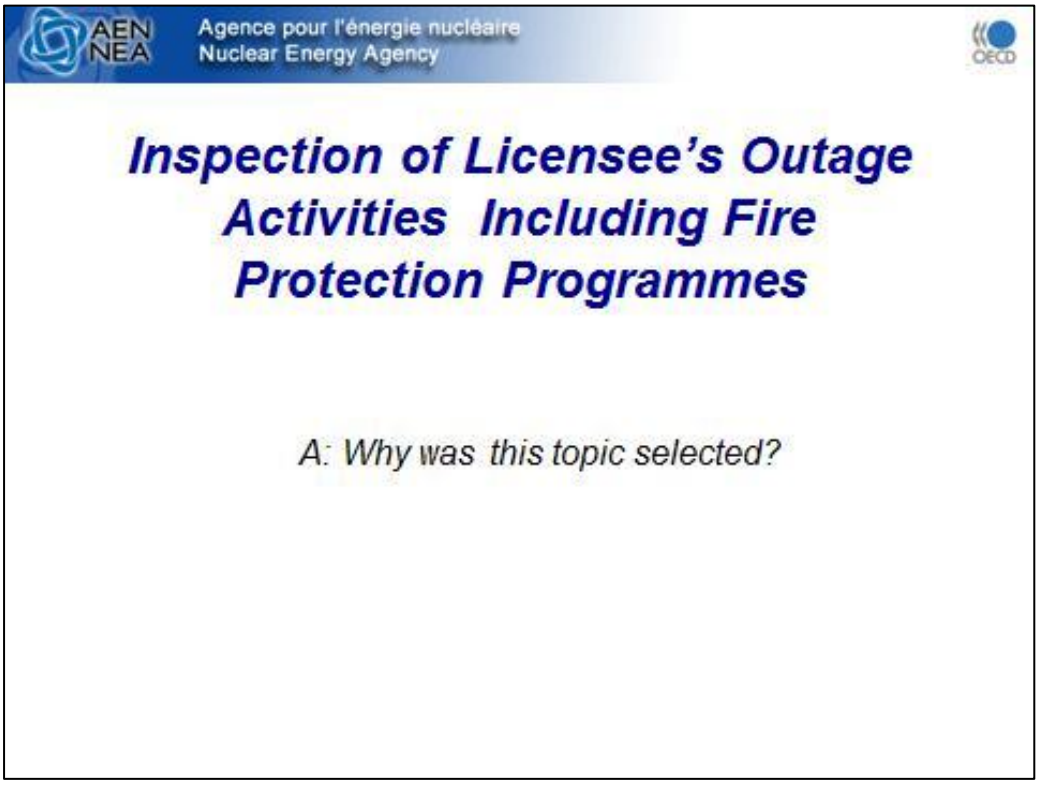
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

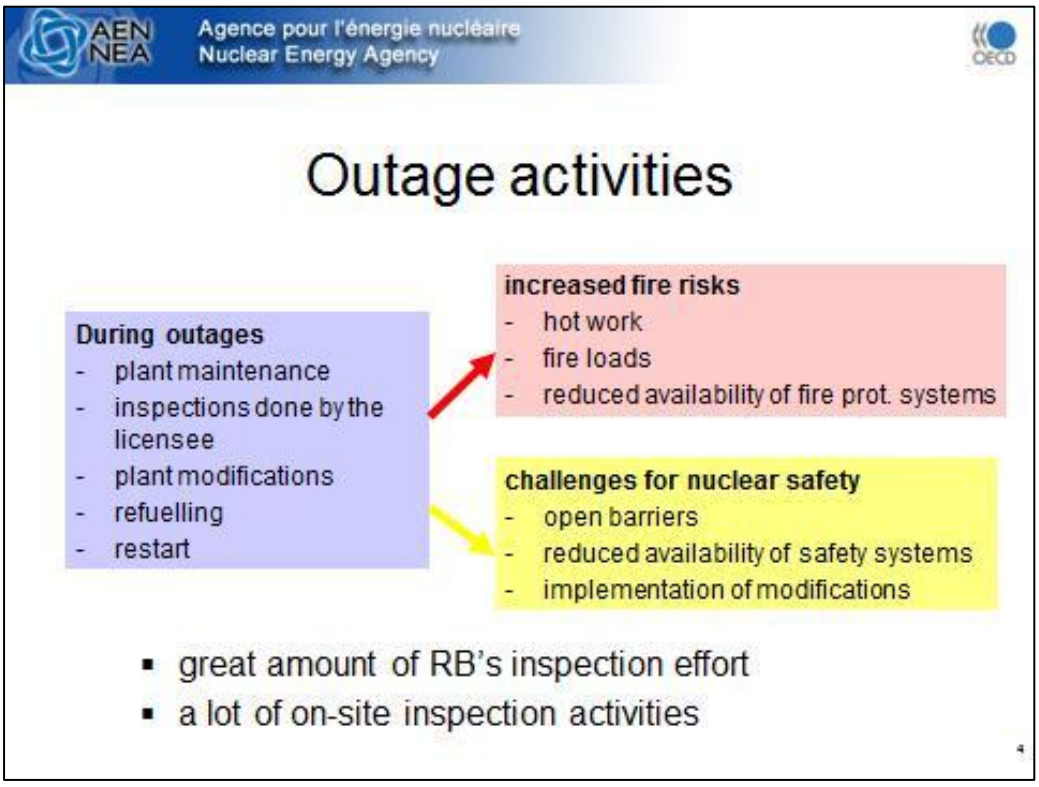
Thank You!

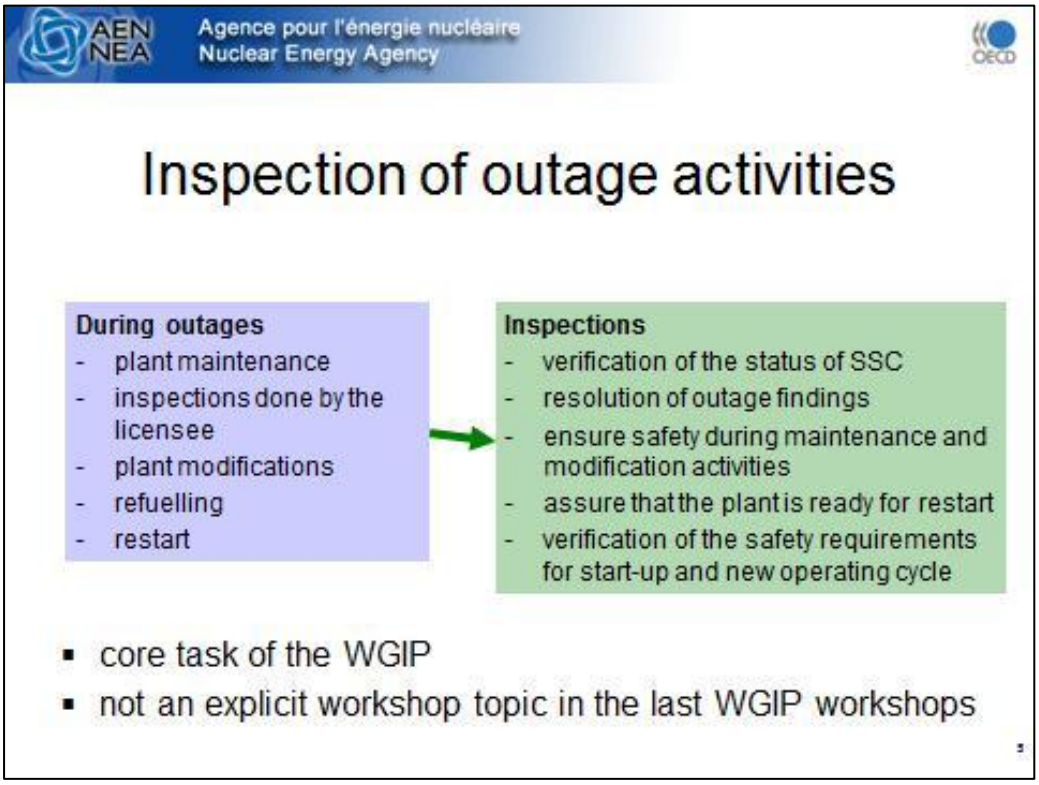
11. TOPIC A: INSPECTION OF LICENSEE'S OUTAGE ACTIVITIES INCLUDING FIRE PROTECTION PROGRAMMES - OPENING PRESENTATION

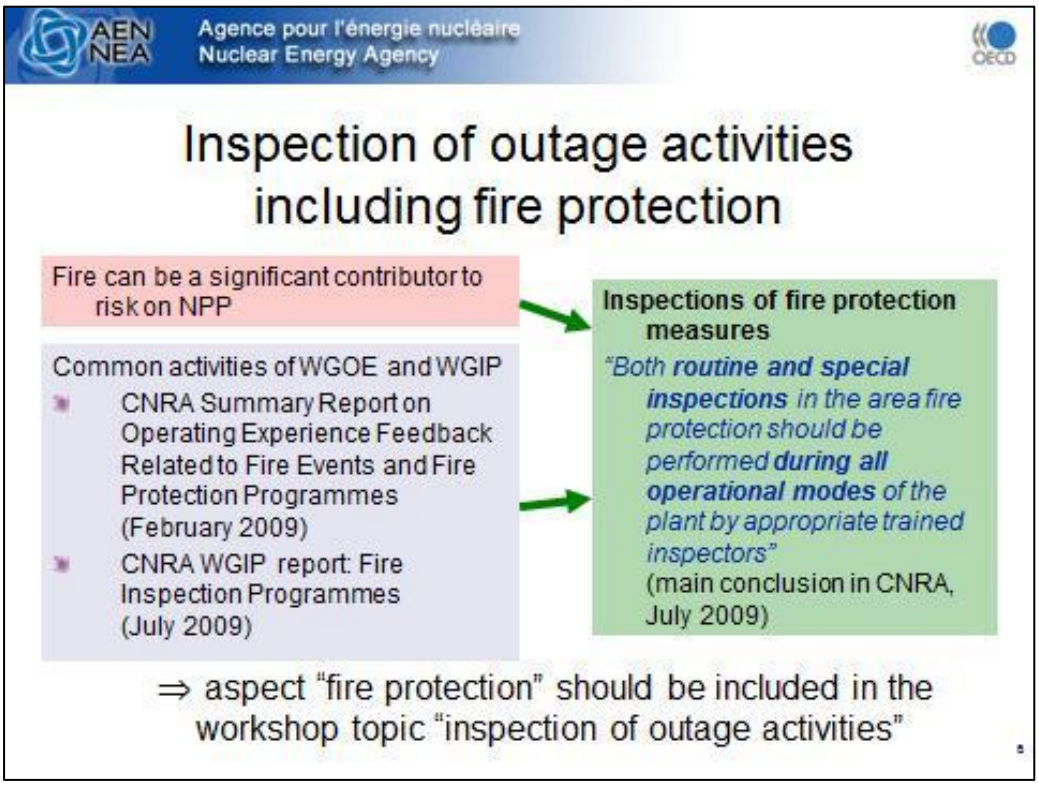

Agence pour l'énergie nucléaire
Nuclear Energy Agency
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
12th International Nuclear Regulatory Inspection Workshop
Inspection of Licensee's Outage Activities Including Fire Protection Programmes
Hosted by United States Nuclear Regulatory Commission
Chattanooga, Tennessee, USA, 7th – 10th April 2014
1


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Introduction and stimulus for the group discussions
A: Why was this topic selected?
B: What do we learn from the questionnaire responses?
C: What is the goal of the group discussions?


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Inspection of Licensee's Outage Activities Including Fire Protection Programmes
A: Why was this topic selected?


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Outage activities
During outages
- plant maintenance
- inspections done by the licensee
- plant modifications
- refuelling
- restart
increased fire risks
- hot work
- fire loads
- reduced availability of fire prot. systems
challenges for nuclear safety
- open barriers
- reduced availability of safety systems
- implementation of modifications
great amount of RB's inspection effort
a lot of on-site inspection activities


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Inspection of outage activities
During outages
- plant maintenance
- inspections done by the licensee
- plant modifications
- refuelling
- restart
Inspections
- verification of the status of SSC
- resolution of outage findings
- ensure safety during maintenance and modification activities
- assure that the plant is ready for restart
- verification of the safety requirements for start-up and new operating cycle
core task of the WGIP
not an explicit workshop topic in the last WGIP workshops


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Inspection of outage activities including fire protection
Fire can be a significant contributor to risk on NPP
Common activities of WGOE and WGIP
CNRA Summary Report on Operating Experience Feedback Related to Fire Events and Fire Protection Programmes (February 2009)
CNRA WGIP report: Fire Inspection Programmes (July 2009)
Inspections of fire protection measures
"Both routine and special inspections in the area fire protection should be performed during all operational modes of the plant by appropriate trained inspectors"
(main conclusion in CNRA, July 2009)
⇒ aspect "fire protection" should be included in the workshop topic "inspection of outage activities"

Agence pour l'énergie nucléaire
Nuclear Energy Agency

Inspection of Licensee's Outage Activities Including Fire Protection Programmes

B: What do we learn from the questionnaire responses?

responses from 17 countries

significant differences are highlighted in green

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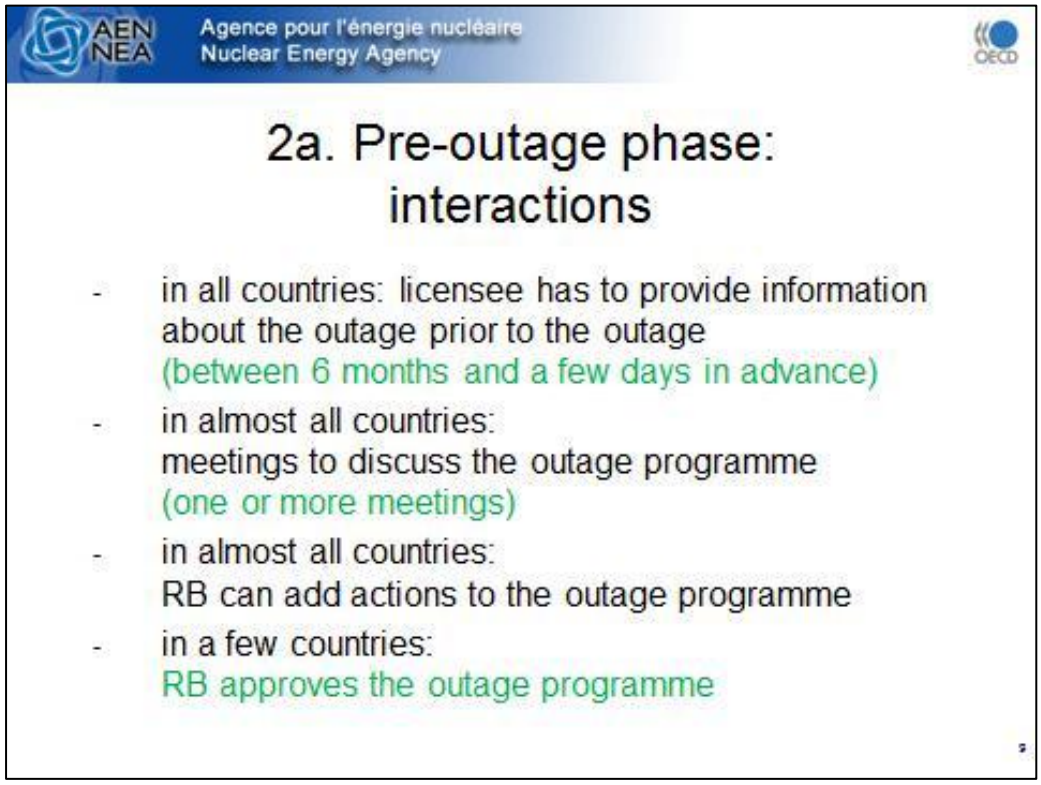
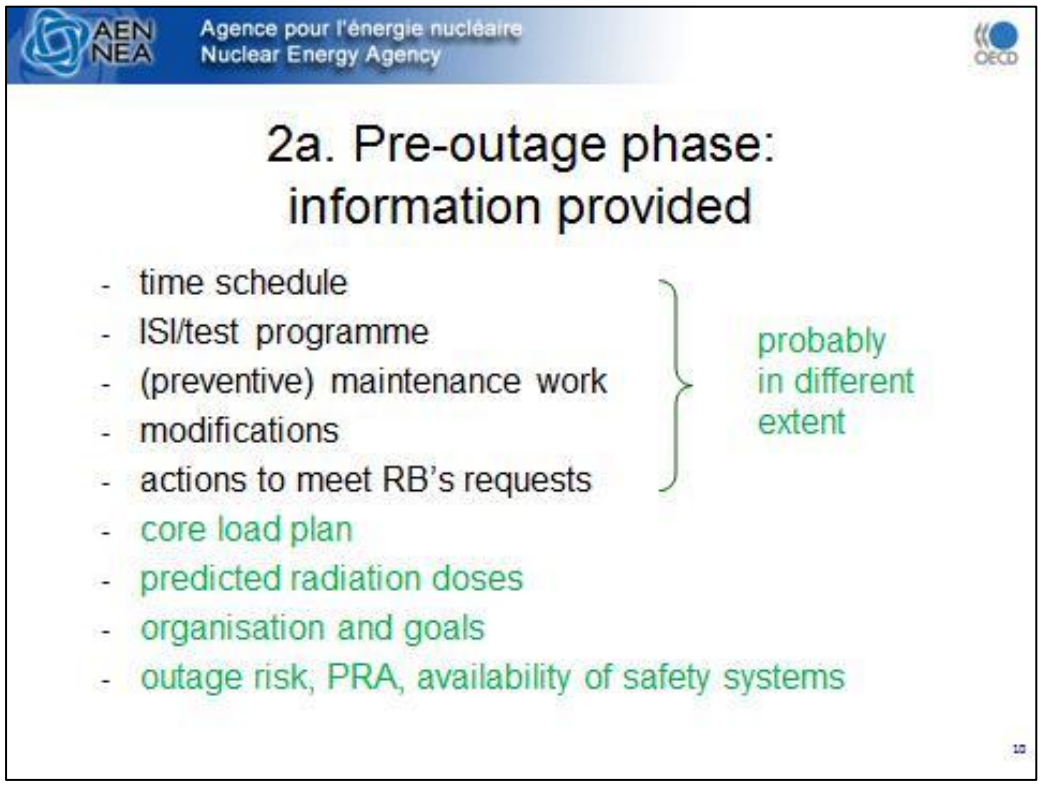
Nuclear Energy Agency

1. Regulatory requirements: outage and fire protection during outage

- in most countries: general requirement for ISI, periodic inspections, maintenance, test intervals etc. (governing outage intervals)
- in some countries: requirement for authorization of restart
- in some countries: requirement for submission of documents (plans, reports, verifications etc.)
- in almost all countries: general fire protection regulation, no specific fire protection requirements for outages
- in some countries: consideration of the special outage situation required
- in one country: a specific detailed fire safety plan required for the outage


Agence pour l'énergie nucléaire
Nuclear Energy Agency
2a. Pre-outage phase: interactions
- in all countries: licensee has to provide information about the outage prior to the outage (between 6 months and a few days in advance)
- in almost all countries: meetings to discuss the outage programme (one or more meetings)
- in almost all countries: RB can add actions to the outage programme
- in a few countries: RB approves the outage programme


Agence pour l'énergie nucléaire
Nuclear Energy Agency
2a. Pre-outage phase: information provided
- time schedule
- ISI/test programme
- (preventive) maintenance work
- modifications
- actions to meet RB's requests
probably in different extent
- core load plan
- predicted radiation doses
- organisation and goals
- outage risk, PRA, availability of safety systems

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Nuclear Energy Agency

2b. During the outage: monitoring progress

- in almost all countries: daily information
  reports, meetings, telephone calls, communication
- some countries: direct database access
  CAP database, outage programme, documents
- additionally:
  - routine/weekly meetings
  - reports about findings, unplanned occurrences, radiation protection issues etc.
  - updated schedules

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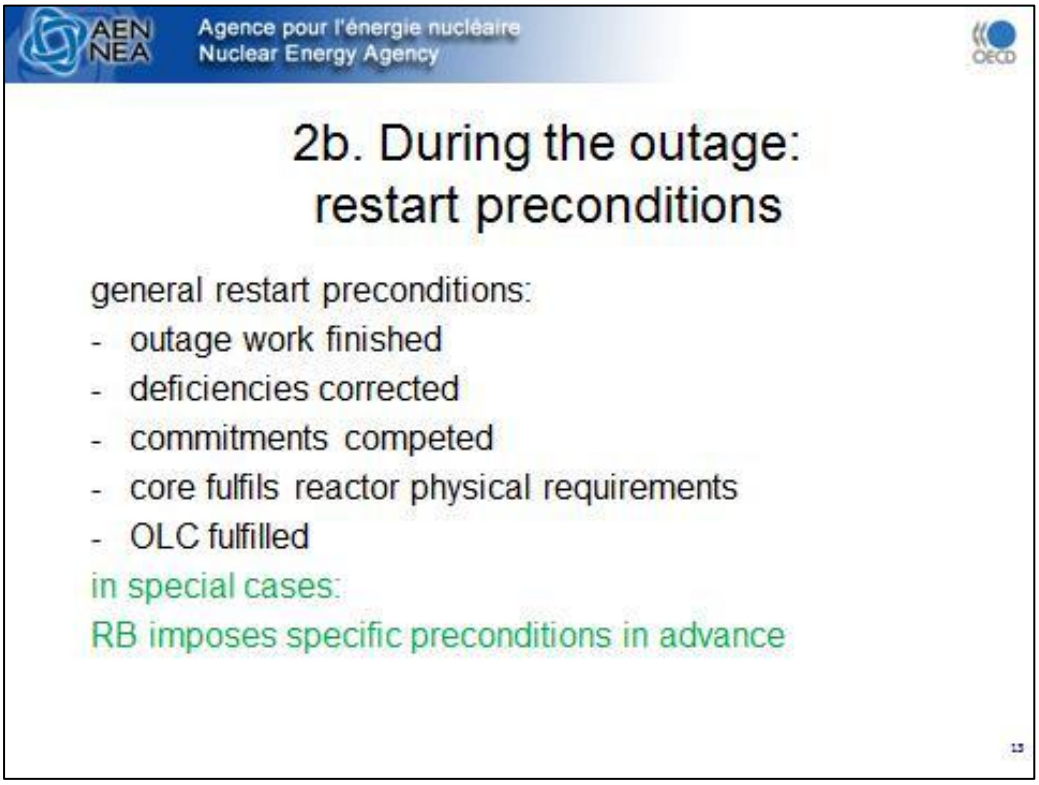
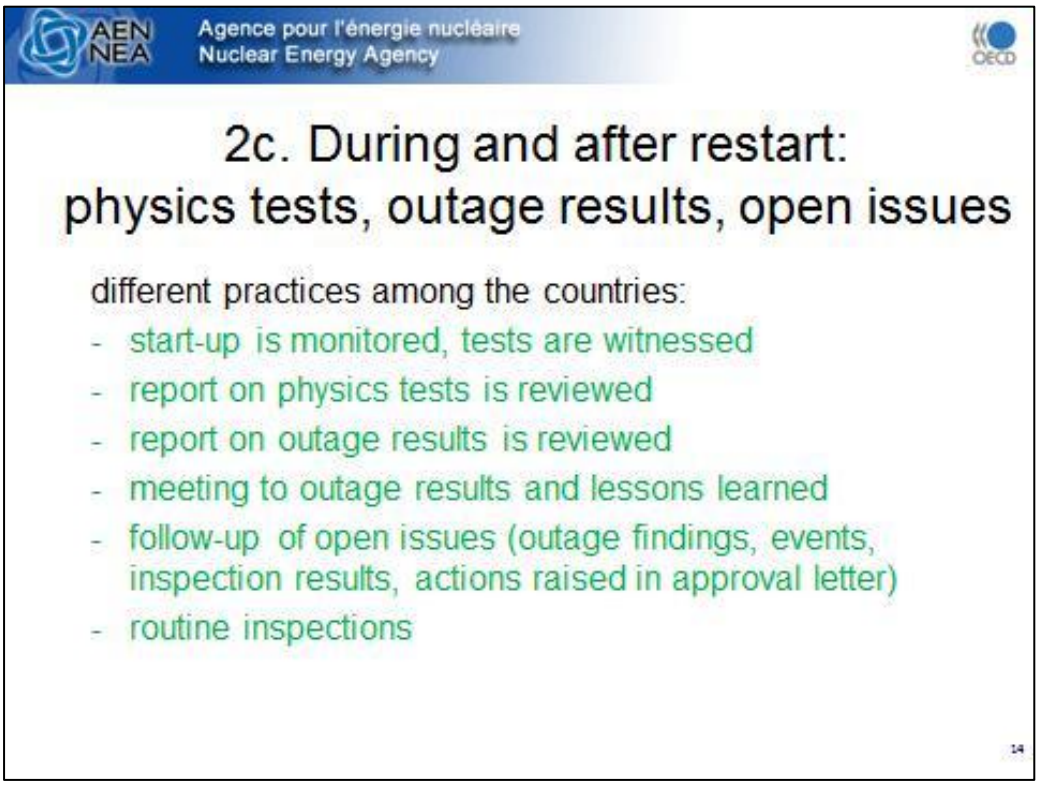
Nuclear Energy Agency

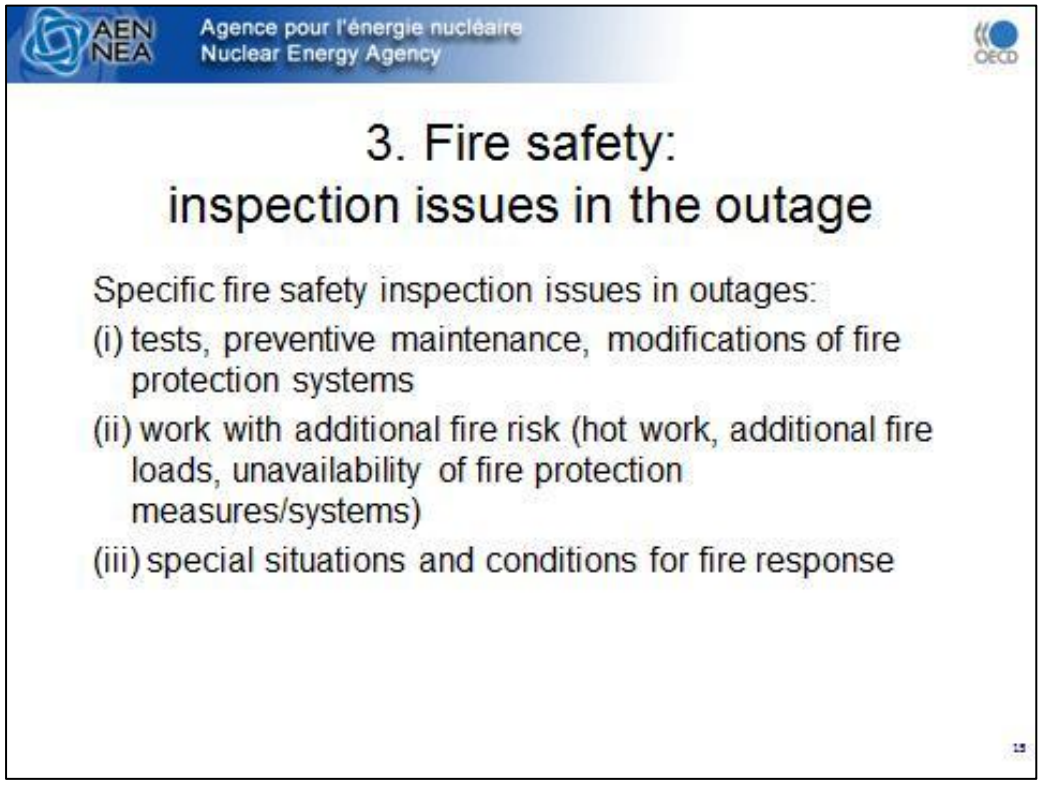
2b. During the outage: witness or hold points, restart approval

- hold points:
  - predefined ISI/tests are witnessed by RB or TSO
  - in connection with the implementation of modifications
  - refuelling
  - closure of RPV
  - deboration
- **half of the countries: formal restart authorization on basis of reports, meeting or final inspection**
- other half: checks or inspections, interventions if necessary

12


Agence pour l'énergie nucléaire
Nuclear Energy Agency
2b. During the outage:
restart preconditions
general restart preconditions:
- outage work finished
- deficiencies corrected
- commitments competed
- core fulfils reactor physical requirements
- OLC fulfilled
in special cases:
RB imposes specific preconditions in advance
13


Agence pour l'énergie nucléaire
Nuclear Energy Agency
2c. During and after restart:
physics tests, outage results, open issues
different practices among the countries:
- start-up is monitored, tests are witnessed
- report on physics tests is reviewed
- report on outage results is reviewed
- meeting to outage results and lessons learned
- follow-up of open issues (outage findings, events, inspection results, actions raised in approval letter)
- routine inspections
14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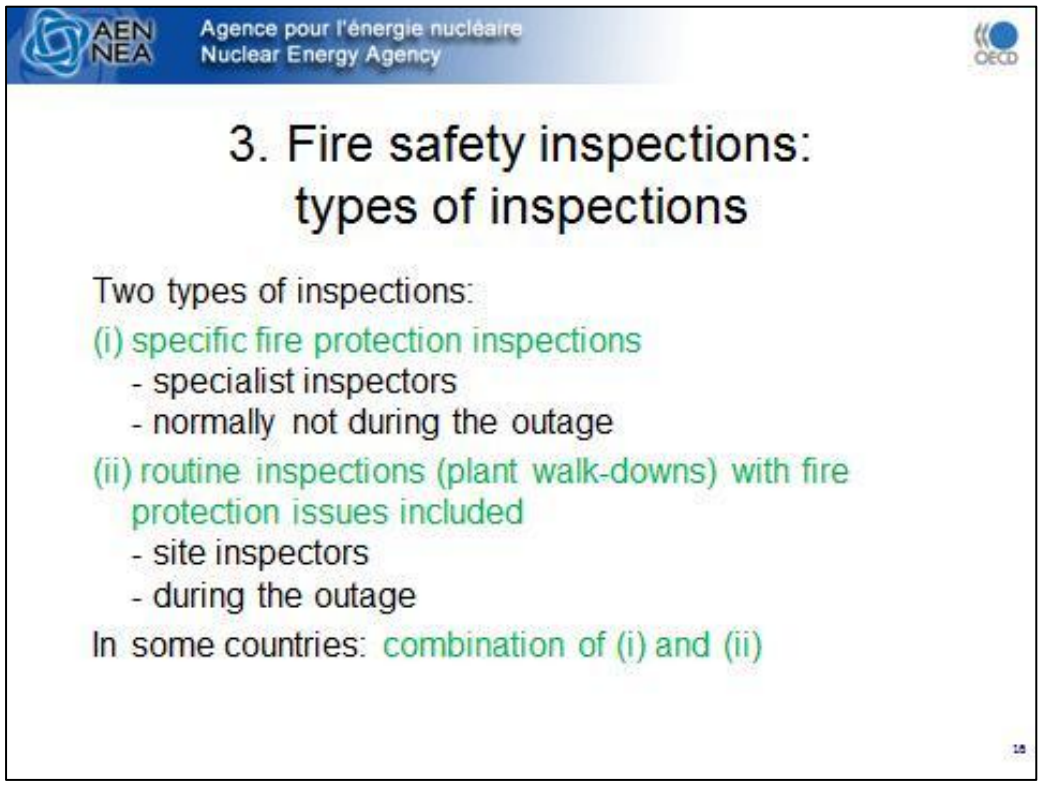
Nuclear Energy Agency
3. Fire safety:
inspection issues in the outage
Specific fire safety inspection issues in outages:
(i) tests, preventive maintenance, modifications of fire protection systems
(ii) work with additional fire risk (hot work, additional fire loads, unavailability of fire protection measures/systems)
(iii) special situations and conditions for fire response


Agence pour l'énergie nucléaire
Nuclear Energy Agency
3. Fire safety inspections:
types of inspections
Two types of inspections:
(i) specific fire protection inspections
- specialist inspectors
- normally not during the outage
(ii) routine inspections (plant walk-downs) with fire protection issues included
- site inspectors
- during the outage
In some countries: combination of (i) and (ii)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3. Fire safety inspections: fire protection systems
Tests and maintenance activities of fire protection systems:
- in some countries: witnessed/checked/inspected with specific inspections
- in some countries: covered by routine inspections
- in some other countries: records are inspected in a specific fire protection inspection
17


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Nuclear Energy Agency
3. Fire safety inspections: fire risk and fire response
Control of fire risks:
- in most countries: inspection by plant walk-downs
- in some countries: assessment of work planning, work permits (for major works)
- in some countries: specialist inspection
Arrangements for fire response:
- in most countries: reports of trainings and drills are reviewed/assessed
- in some countries: fire response plan or general fire response arrangements are assessed
18

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4. Outage inspections: inspection scope

- in half of the countries:
  defined list of outage inspection topics
- most of the other countries:
  outage inspection topics are determined on basis a general inspection list
- in a lot of countries:
  - routine inspections by site inspectors which cover several inspection topics
  - additionally specialist inspections
- in some countries:
  TSO support in inspecting ISI, management system

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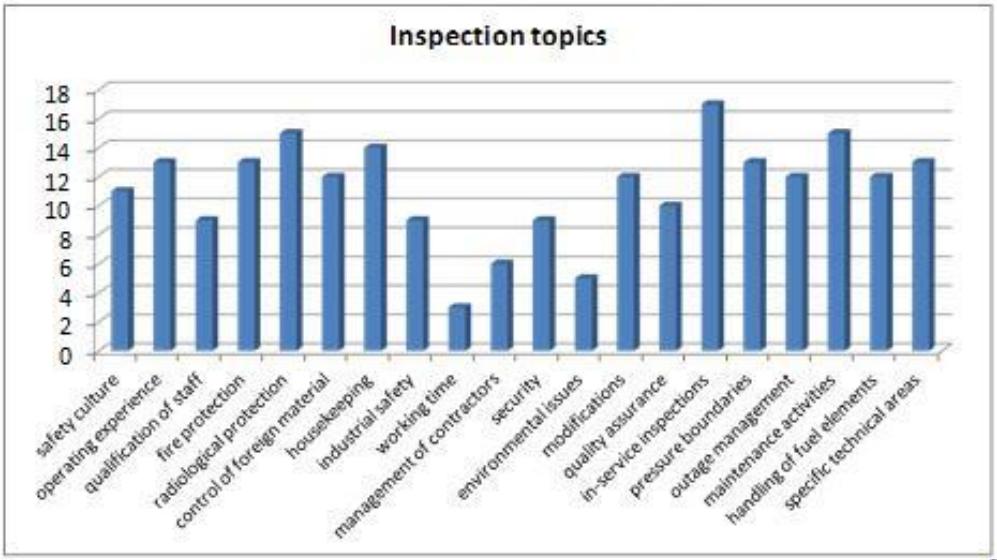
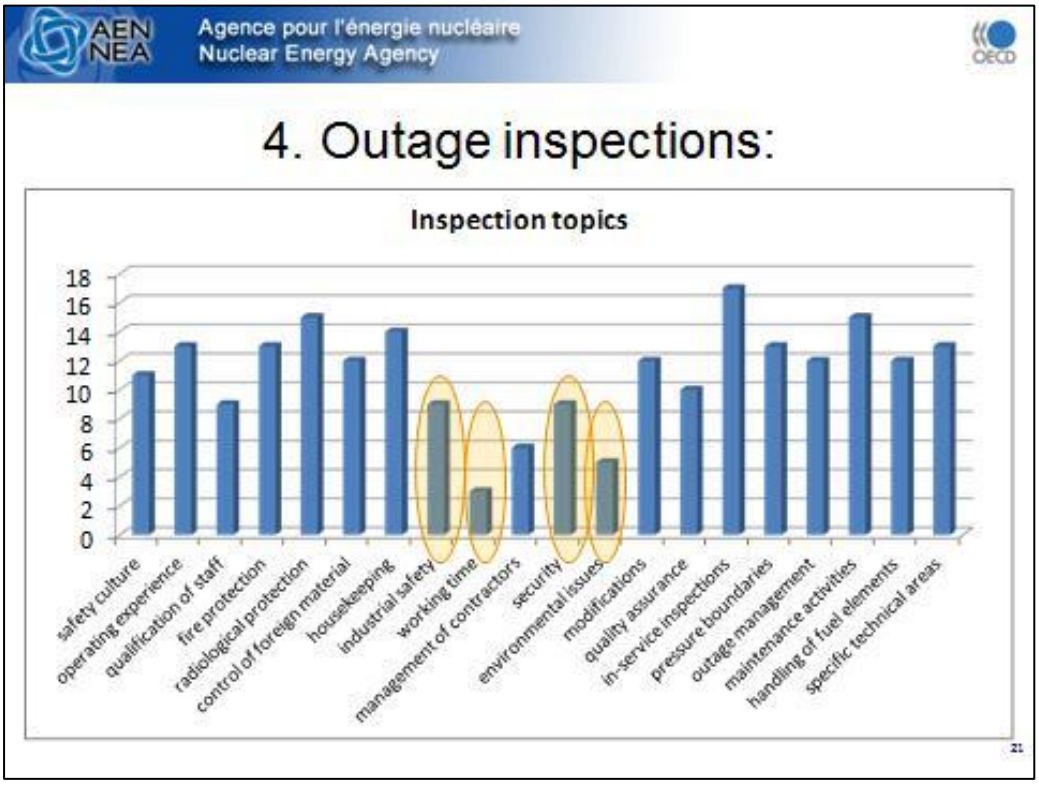
4. Outage inspections:

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Nuclear Energy Agency
4. Outage inspections:
Inspection topics
18
16
14
12
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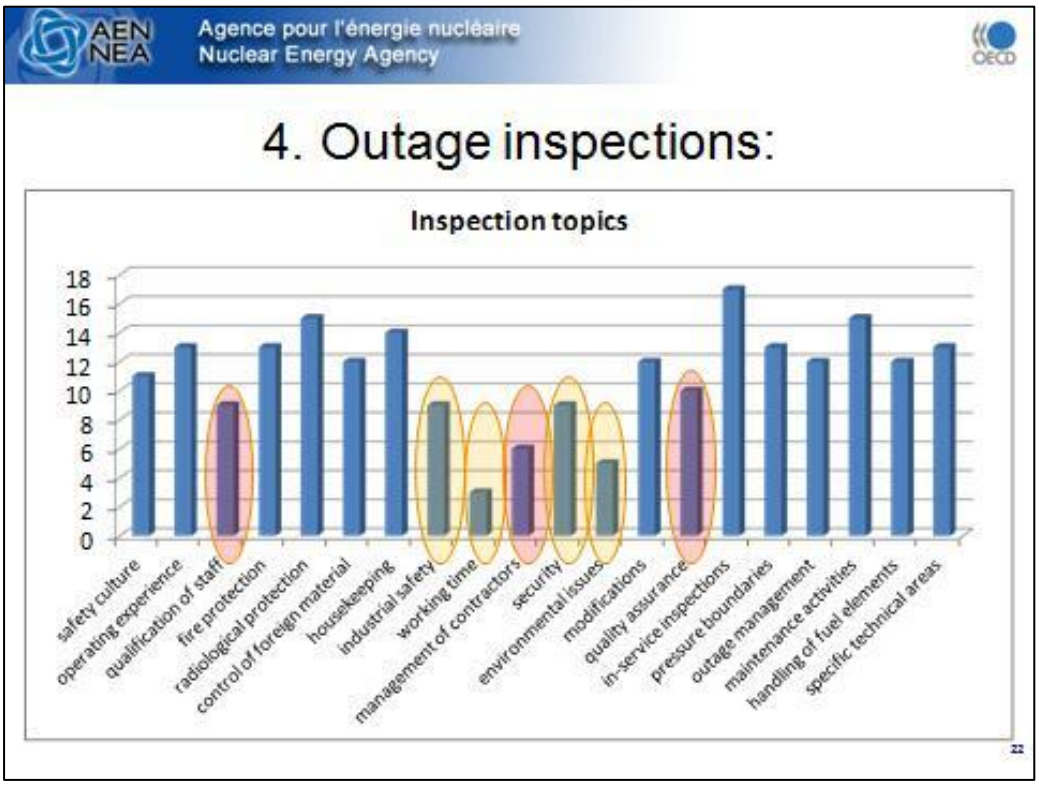
safety culture
operating experience
qualification of staff
fire protection
radiological protection
control of foreign material
housekeeping
industrial safety
working time
management of contractors
security
environmental issues
modifications
quality assurance
in-service inspections
pressure boundaries
outage management
maintenance activities
handling of fuel elements
specific technical areas
21


Agence pour l'énergie nucléaire
Nuclear Energy Agency
4. Outage inspections:
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18
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safety culture
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environmental issues
modifications
quality assurance
in-service inspections
pressure boundaries
outage management
maintenance activities
handling of fuel elements
specific technical areas
22

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4. Outage inspections: evaluation of nuclear risks

different answers (understanding of the question, emphasis):

- approval of important documents (plans, procedures, work planning, activities etc.) before the outage
- check of compliance with technical specifications, check of the conditions for ISI
- check of the licensee's measures to ensure safety, licensee's safety management
- risk monitoring using PSA or risk levels
- risk informed approach in planning inspections, strong focus on nuclear safety in all inspections
- daily monitoring, normal on-site inspections

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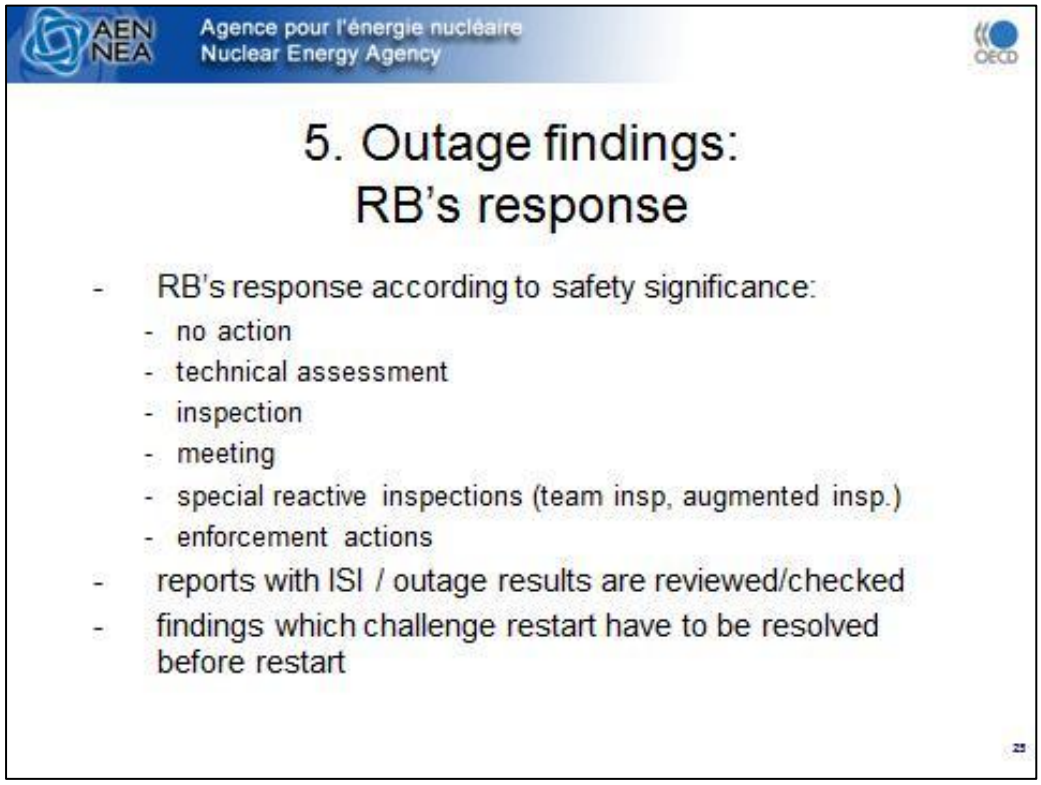
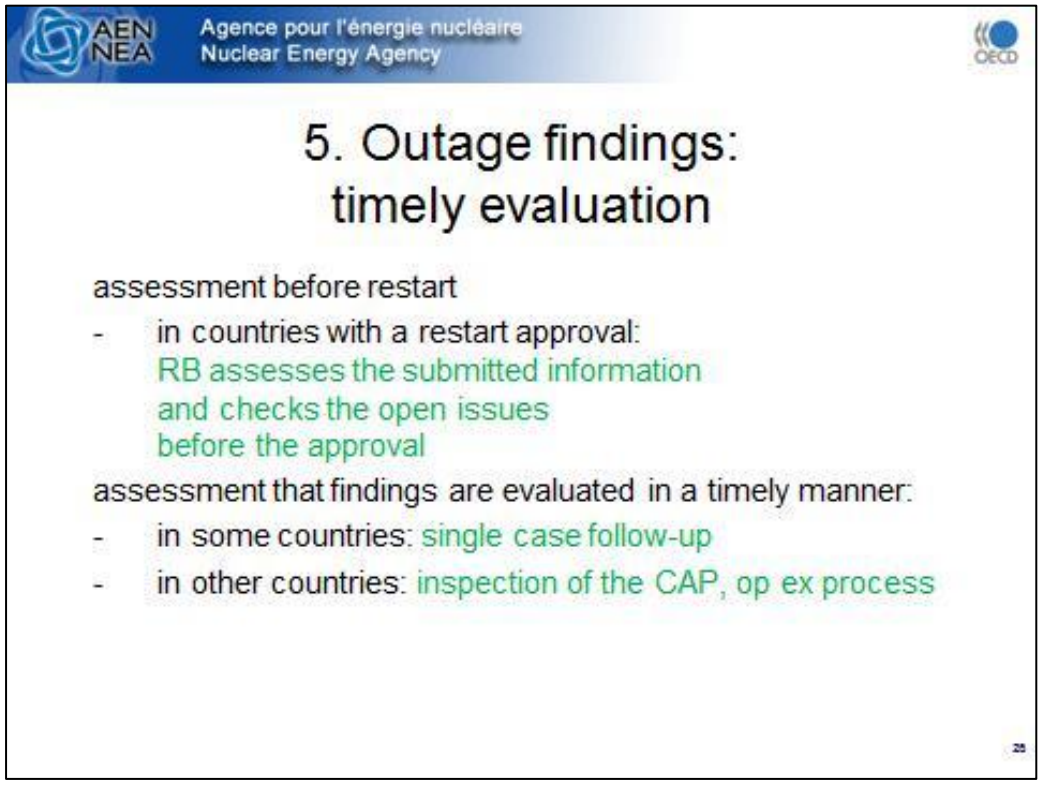
Nuclear Energy Agency

5. Outage findings: information of the RB

- in all countries: reportable events
  licensee: notification and reporting
  RB: evaluation and assessment
- in most countries: informal communication of outage findings (e.g. daily interaction, briefings/meetings, phone calls)
- in some countries: reporting of outage findings (low level event reports, listing of findings, report of licensee's ISI results)
- in most countries: all fire occurrences are communicated
- in the other countries: according criteria
  - only major fires
  - when local fire brigade is alarmed
  - fires which affected safety significant SSC

24


Agence pour l'énergie nucléaire
Nuclear Energy Agency
5. Outage findings:
RB's response
- RB's response according to safety significance:
- no action
- technical assessment
- inspection
- meeting
- special reactive inspections (team insp, augmented insp.)
- enforcement actions
- reports with ISI / outage results are reviewed/checked
- findings which challenge restart have to be resolved before restart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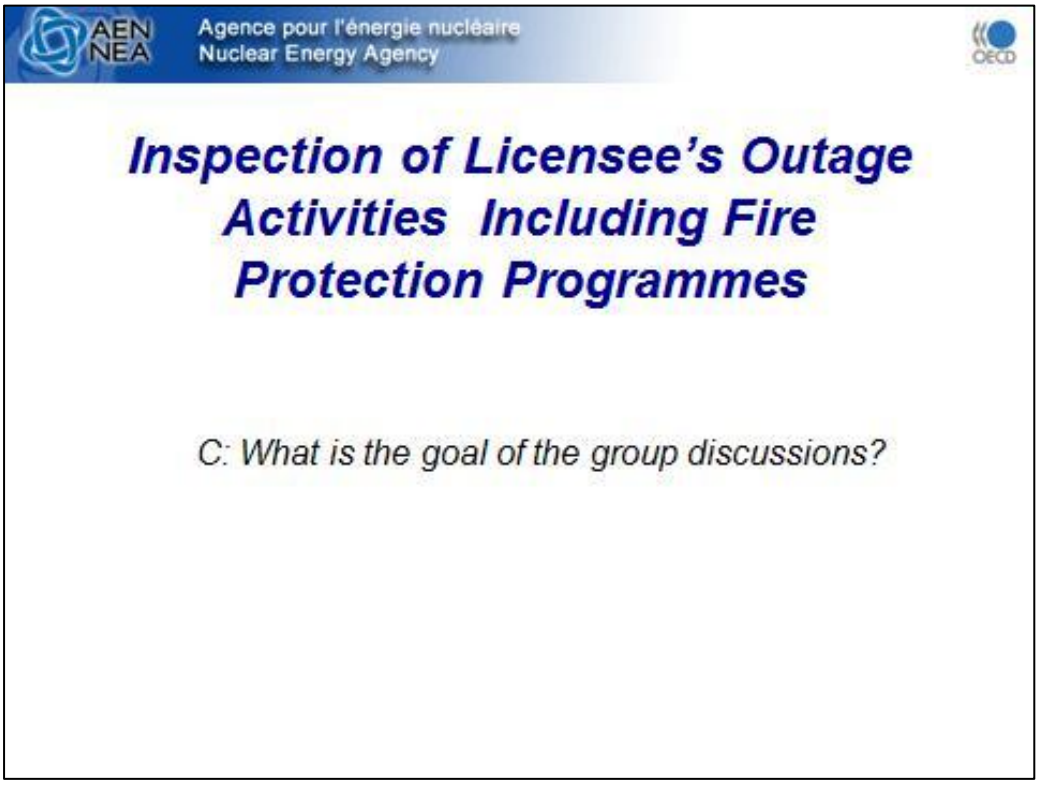
Nuclear Energy Agency
5. Outage findings:
timely evaluation
assessment before restart
- in countries with a restart approval:
RB assesses the submitted information
and checks the open issues
before the approval
assessment that findings are evaluated in a timely manner:
- in some countries: single case follow-up
- in other countries: inspection of the CAP, op ex process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Nuclear Energy Agency
Inspection of Licensee's Outage Activities Including Fire Protection Programmes
C: What is the goal of the group discussions?


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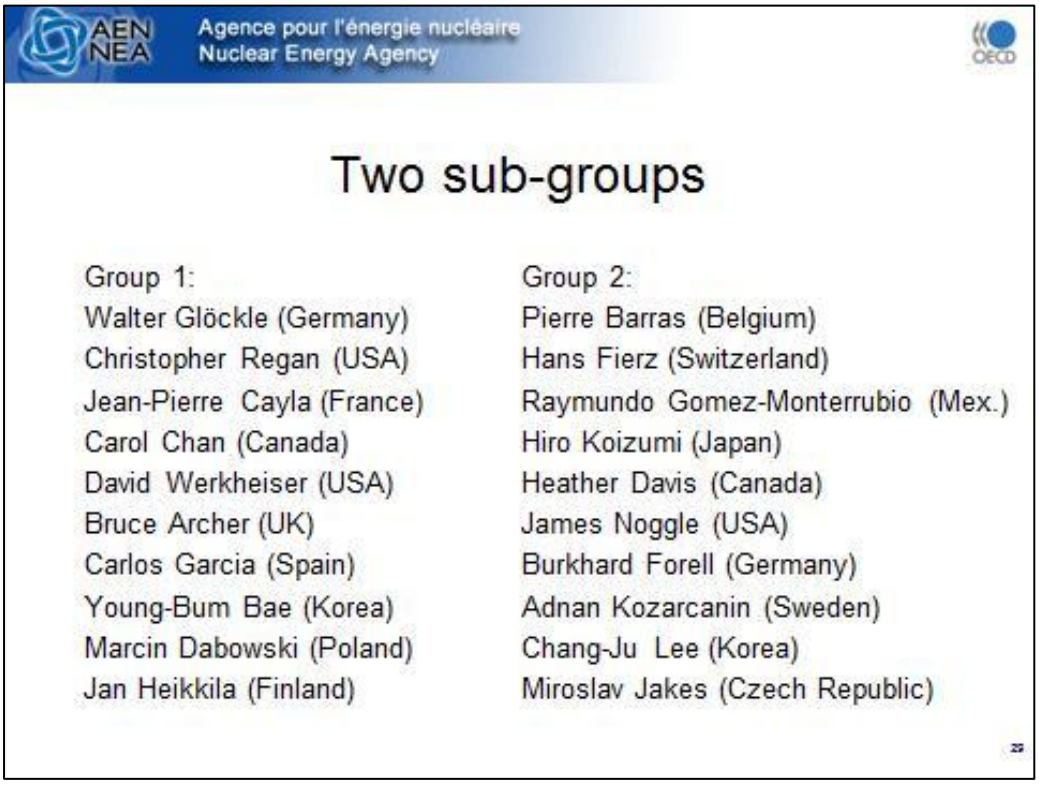
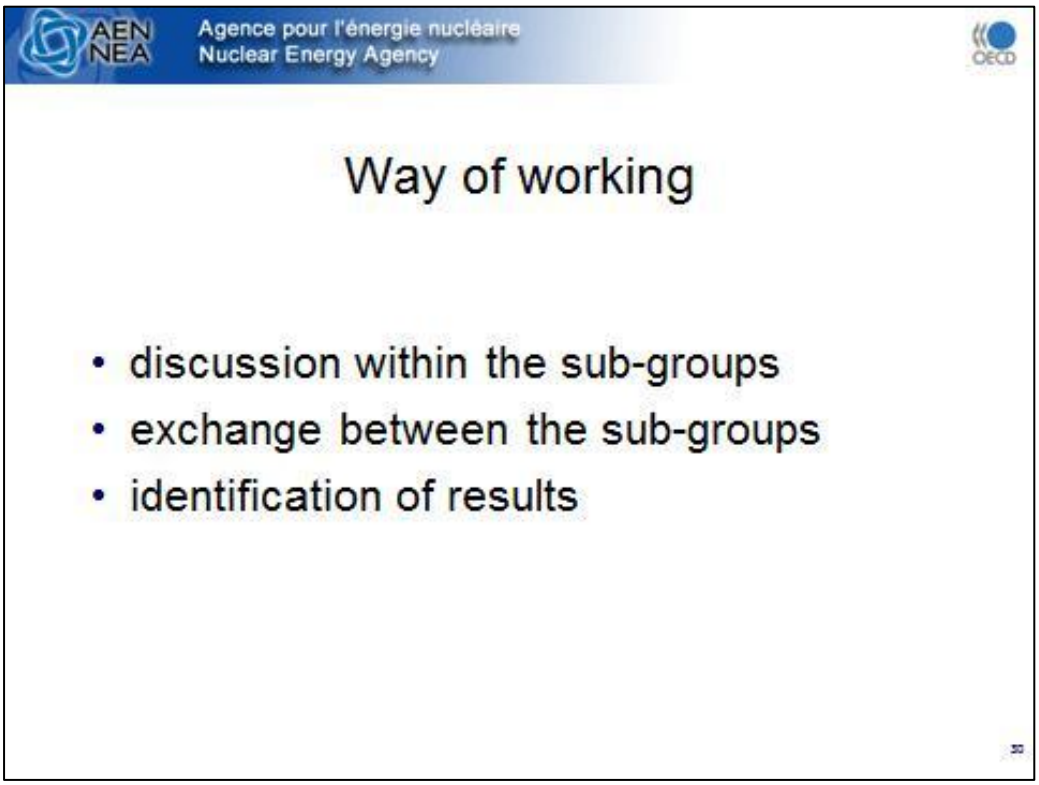
Nuclear Energy Agency
Goal of the workshop
1. share experience
2. identify commendable practices
everybody: listen and talk
facilitator and recorder: support


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Two sub-groups
Group 1:
Walter Glöckle (Germany)
Christopher Regan (USA)
Jean-Pierre Cayla (France)
Carol Chan (Canada)
David Werkheiser (USA)
Bruce Archer (UK)
Carlos Garcia (Spain)
Young-Bum Bae (Korea)
Marcin Dabowski (Poland)
Jan Heikkila (Finland)
Group 2:
Pierre Barras (Belgium)
Hans Fierz (Switzerland)
Raymundo Gomez-Monterrubio (Mex.)
Hiro Koizumi (Japan)
Heather Davis (Canada)
James Noggle (USA)
Burkhard Forell (Germany)
Adnan Kozarcanin (Sweden)
Chang-Ju Lee (Korea)
Miroslav Jakes (Czech Republic)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Nuclear Energy Agency
Way of working
• discussion within the sub-groups
• exchange between the sub-groups
• identification of results


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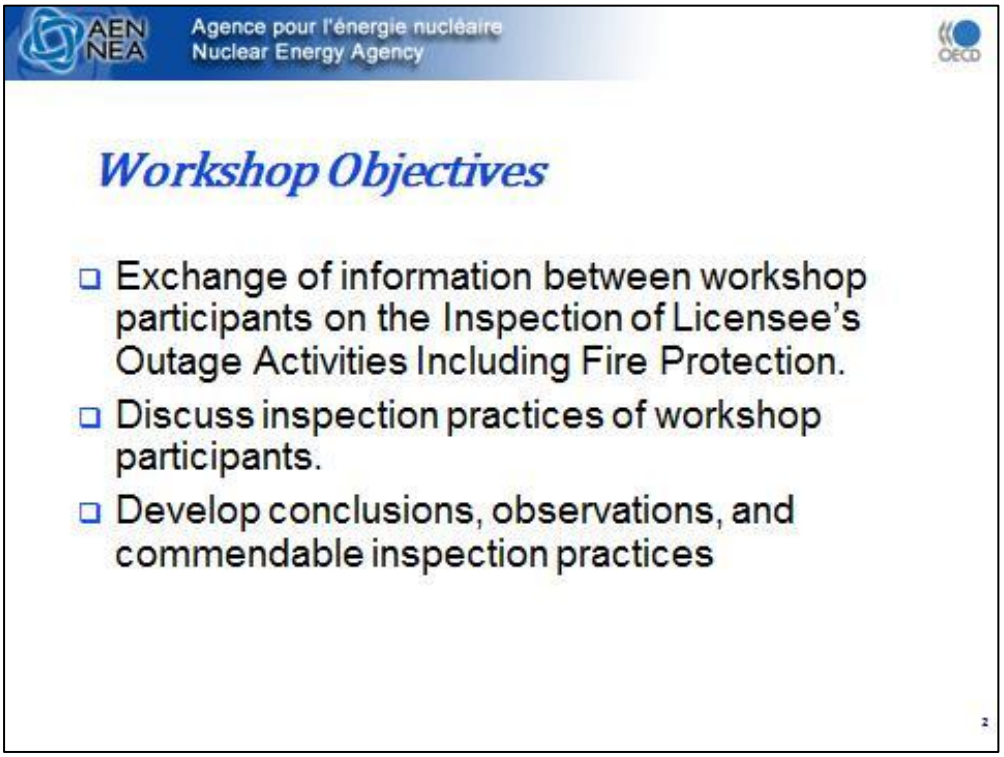
Nuclear Energy Agency
Topics for the discussion (1)
Pros and cons of a restart approval?
Useful interaction/information to monitor outage progress?
How to inspect the implementation of modifications?
Experience with fire protection inspection during outage
Interaction: assessment of core load plan – inspection of core components
31


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Topics for the discussion (2)
Experience with TSO involvement
Fire protection within routine inspections
specific fire protection inspections
.....
.....
Self-responsibility of the site inspector
harmonized procedure for all NNP
Practices for verifying that all outage findings relevant for restart are resolved
32


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Fruitful discussions
Questionnaires:
a lot of information, experiences, stimulations for discussions
Participants:
personal opinions, questions, experiences
We are looking forward to successful group discussions!

12. TOPIC A: INSPECTION OF LICENSEE'S OUTAGE ACTIVITIES INCLUDING FIRE PROTECTION PROGRAMMES CLOSING PRESENTATION


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
12th International Workshop on Nuclear Regulatory Inspection Activities
Conclusions of
Inspection of Licensee's Outage Activities
Including Fire Protection
Groups 1 & 2
Hosted by the U.S. Nuclear Regulatory Commission
Chattanooga, TN, USA 7-10 April 2014
1


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Workshop Objectives
Exchange of information between workshop participants on the Inspection of Licensee's Outage Activities Including Fire Protection.
Discuss inspection practices of workshop participants.
Develop conclusions, observations, and commendable inspection practices
2

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Nuclear Energy Agency

3

Agence pour l'énergie nucléaire
Nuclear Energy Agency

Workshop Discussion Groups

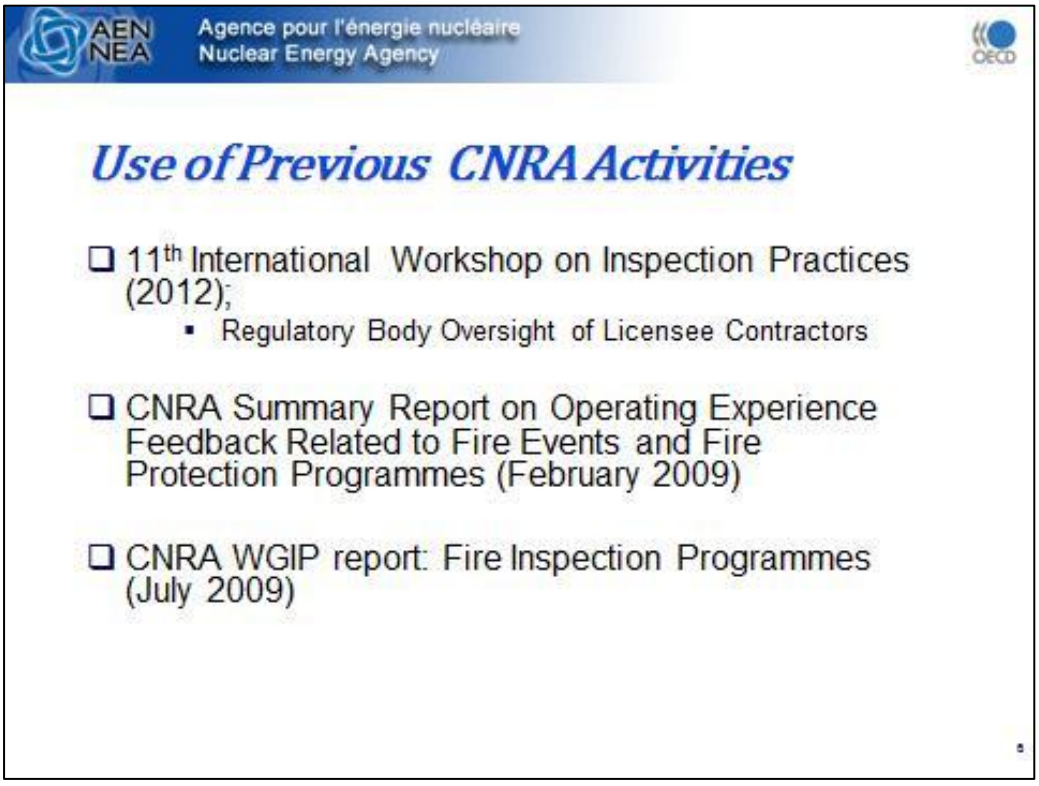
Inspection of Licensee's Outage Activities Including Fire Protection

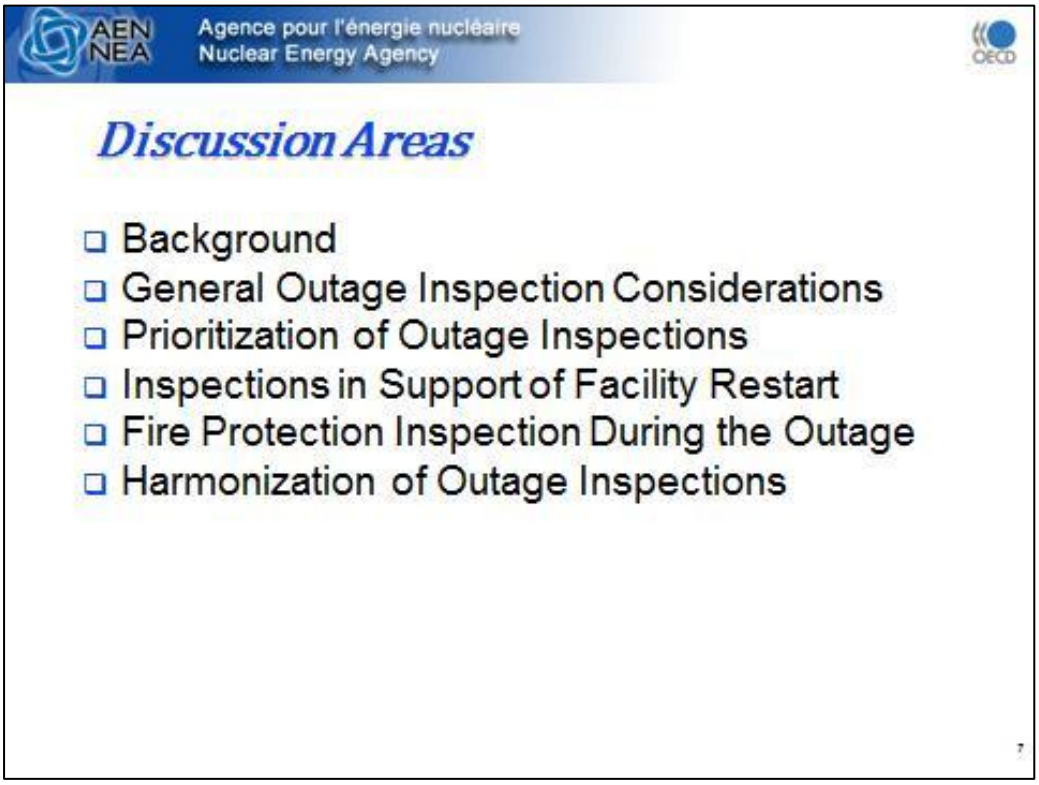
Group 1

- Mr. Walter Glöckle — Germany
- Mr. Christopher Regan — USA
- Mr. Jean-Pierre Cayla — France
- Ms. Carol Chan — Canada
- Mr. David Werkheiser — USA
- Mr. Bruce Archer — UK
- Mr. Carlos Garcia — Spain
- Mr. Young-Bum Bae — Korea
- Mr. Marcin Dabrowksi — Poland
- Mr. Jan Heikkila — Finland

4


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Workshop Discussion Groups
Inspection of Licensee's Outage Activities Including Fire Protection
Group 2
Mr. Pierre Barras Belgium
Mr. Hans Fierz Switzerland
Mr. Raymundo Gomez-Monterrubio Mexico
Mr. Hiro Koizumi Japan
Ms. Heather Davis Canada
Mr. James Noggle USA
Dr. Burkhard Forell Germany
Mr. Adnan Kozarcanin Sweden
Dr. Chang-Ju Lee Korea
Mr. Miroslav Jakes Czech Republic


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Use of Previous CNRA Activities
11th International Workshop on Inspection Practices (2012);
Regulatory Body Oversight of Licensee Contractors
CNRA Summary Report on Operating Experience Feedback Related to Fire Events and Fire Protection Programmes (February 2009)
CNRA WGIP report: Fire Inspection Programmes (July 2009)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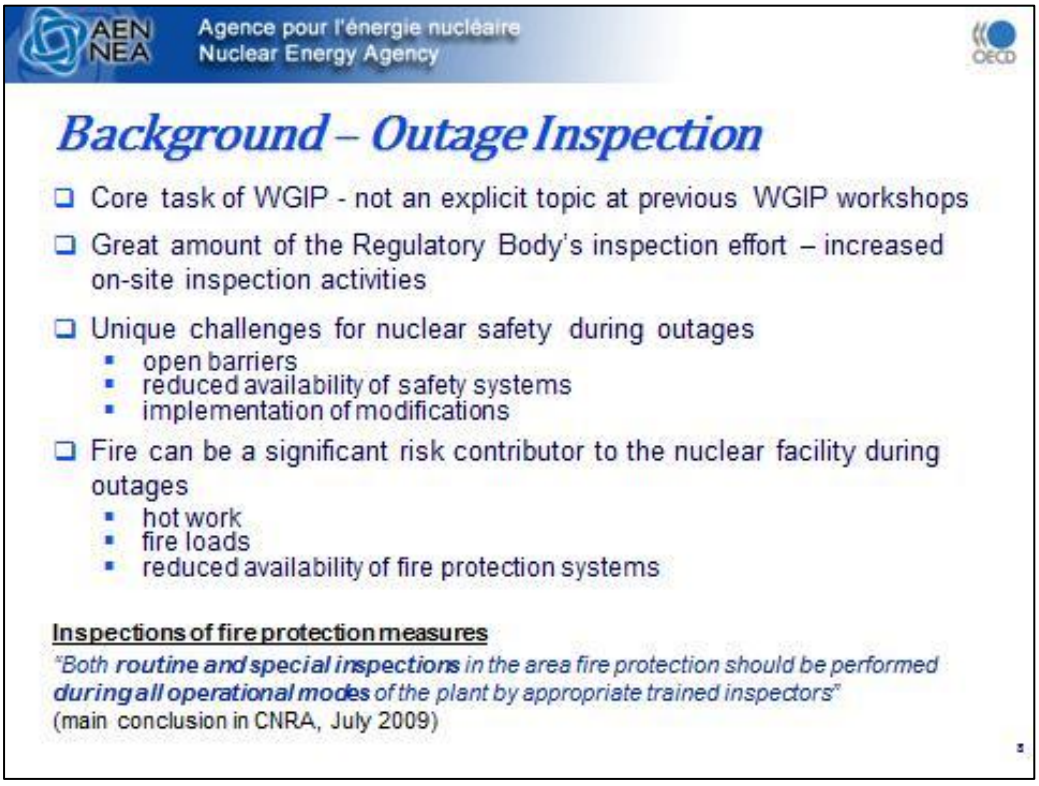
Discussion Areas
Background
General Outage Inspection Considerations
Prioritization of Outage Inspections
Inspections in Support of Facility Restart
Fire Protection Inspection During the Outage
Harmonization of Outage Inspections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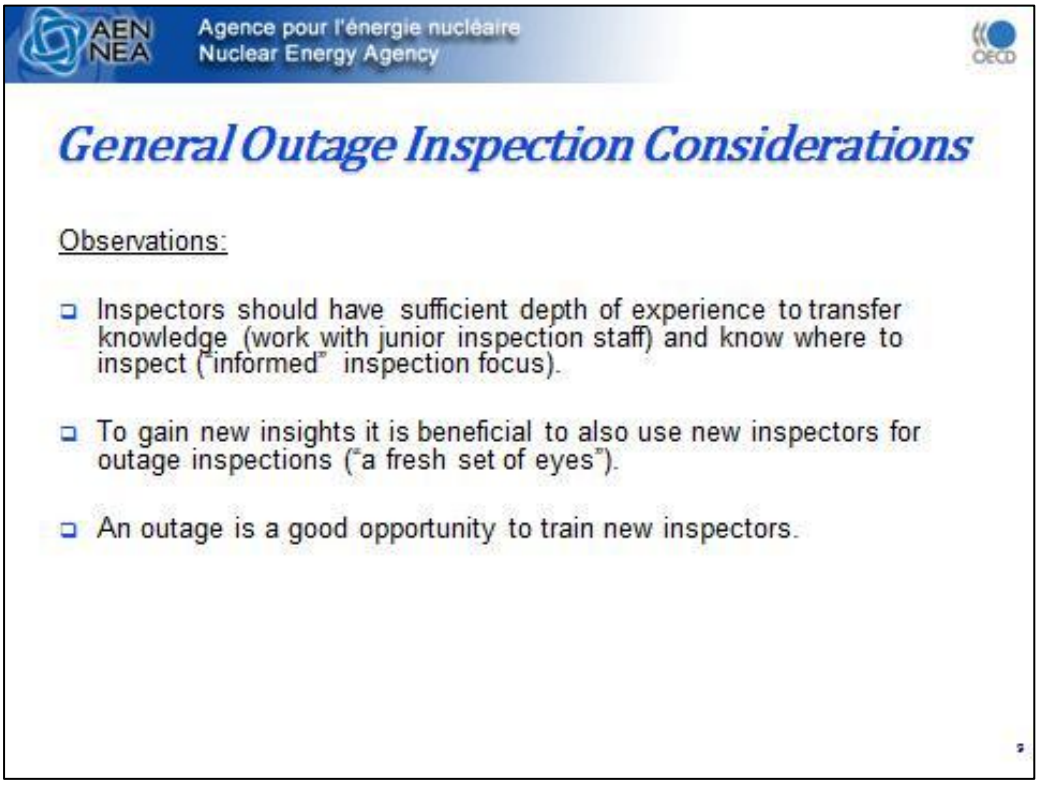
Background – Outage Inspection
Core task of WGIP - not an explicit topic at previous WGIP workshops
Great amount of the Regulatory Body's inspection effort – increased on-site inspection activities
Unique challenges for nuclear safety during outages
open barriers
reduced availability of safety systems
implementation of modifications
Fire can be a significant risk contributor to the nuclear facility during outages
hot work
fire loads
reduced availability of fire protection systems
Inspections of fire protection measures
"Both routine and special inspections in the area fire protection should be performed during all operational modes of the plant by appropriate trained inspectors"
(main conclusion in CNRA, July 2009)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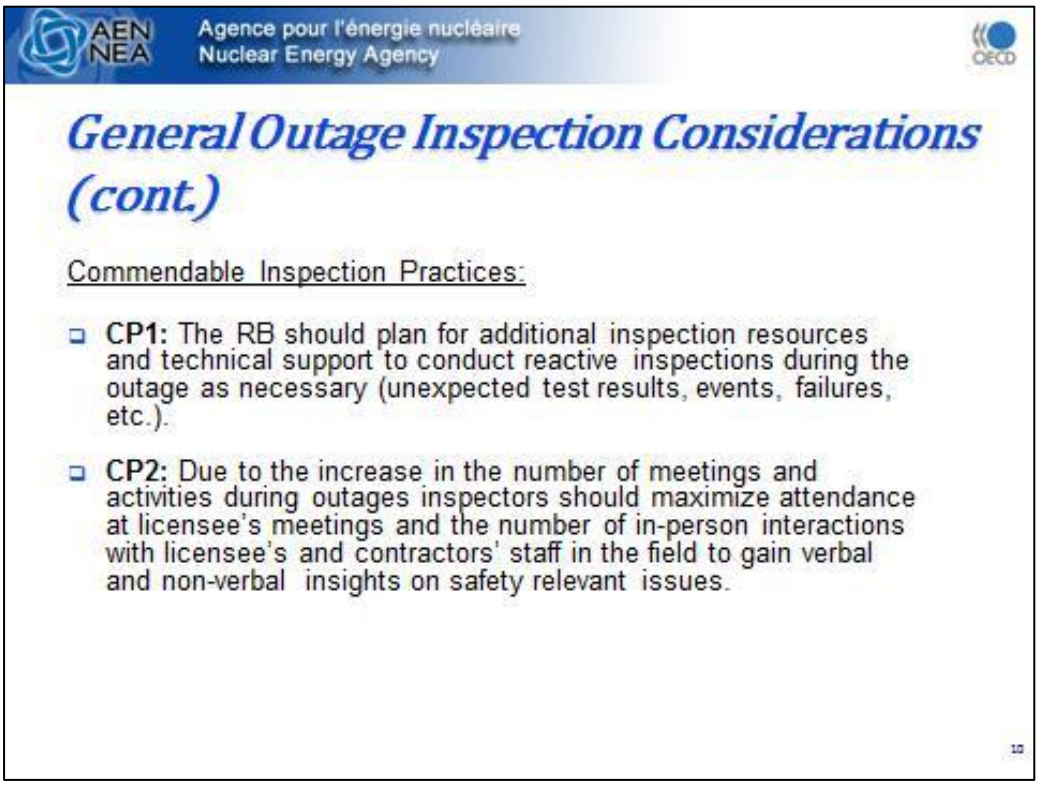
General Outage Inspection Considerations
Observations:
Inspectors should have sufficient depth of experience to transfer knowledge (work with junior inspection staff) and know where to inspect ("informed" inspection focus).
To gain new insights it is beneficial to also use new inspectors for outage inspections ("a fresh set of eyes").
An outage is a good opportunity to train new inspectors.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General Outage Inspection Considerations (cont.)
Commendable Inspection Practices:
CP1: The RB should plan for additional inspection resources and technical support to conduct reactive inspections during the outage as necessary (unexpected test results, events, failures, etc.).
CP2: Due to the increase in the number of meetings and activities during outages inspectors should maximize attendance at licensee's meetings and the number of in-person interactions with licensee's and contractors' staff in the field to gain verbal and non-verbal insights on safety relevant issues.

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General Outage Inspection Considerations (cont.)

Commendable Inspection Practices:

Announced inspections are more effective than unannounced inspections because:
- *The right staff is present to interview*
- *The documents and records are available to review*

However:

- **CP3:** Unannounced inspections by the RB (including during nightshifts, weekends and holidays) should be performed because they can yield more realistic information and help ensure unbiased interactions and communication with the licensee staff.
- **CP4:** The RB should be aware of the licensee's contractor relationship and inspect the licensee's oversight of contractor conducted critical activities and performance of major maintenance and modifications. (refer to previous workshop "Regulatory Body Oversight of Licensee Contractors.")

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Prioritization of Outage Inspections

Commendable Inspection Practices:

- **CP5:** Prioritization of inspection activities should be conducted by responsible resident or site/dedicated inspectors with the support from regulatory body's specialists and with approval of RB's management.
- **CP6:** Outage scope and schedule should be obtained from the licensee well in advance of the outage to allow for the determination of priorities and observations/hold point/witness points by the regulatory body. This should include an expectation that the licensee inform the RB of the schedule and timing of critical activities especially those that can only be witnessed once.

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Prioritization of Outage Inspections (cont.)

Commendable Inspection Practices:

- **CP7:** Outage inspection priorities should consist of modifications, implementation of corrective actions, functional tests, non-destructive tests, radiation protection, fire protection, etc., which are safety significant. Items that could aid in the determination of the significance include:
  - Deterministic requirements including T.S.
  - Results from Probabilistic Safety Assessment (PSA)
  - Operating experience
  - Fire hazard analysis
  - Results from specific assessments (Periodic Safety Review, Stress tests, etc.)
- **CP8:** The RB should take advantage of inspections completed outside of the outage period to optimize the inspection efforts during the outage in areas such as:
  - Management systems
  - The QA programme
  - Safety culture evaluation
  - Training
  - Licensee oversight of contractors

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Inspections in Support of Facility Restart

Commendable Inspection Practices:

- **CP9:** The RB should clearly communicate its expectations on what is necessary for the restart. The RB should seek agreement with the licensee on these expectations. The communication and agreement can be achieved by meetings with a written record. In order to have the possibility to identify emergent issues (events, outage findings, inspection results etc.) in a timely manner, meetings should be routine/periodic.

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Inspections in Support of Facility Restart

Commendable Inspection Practices:

- **CP10:** A single person or organizational unit should be designated within the RB to collect all inspection results and perform a global assessment at the end of the outage to determine if there any objections to restart. Inspection related areas that should be considered for restart include:
  - Compliance with T.S.
  - Specific regulatory inspection results
  - Systems are tested and available
  - Containment closeout
  - Physics testing and In-Service Inspection (ISI)
  - Walk downs (leaks, housekeeping, fire loads, fire barriers, elimination of potential sump clogging materials)
  - Corrective actions for non-conforming conditions
  - Completion of modifications significant to safety
  - Adequate resolution of technical issues
  - List and justification for actions not completed as planned during the outage

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Fire Protection Inspection During the Outage

Observations:

- It is important to perform fire protection inspections during an outage, because of:
  - More hot-work during the outage
  - Greater amount of combustible material onsite/in storage
  - Loss of normal fire separation
  - Unavailability of fire protection systems
  - Opportunity to inspect inaccessible systems, areas, and rooms
  - Increased number of contractor staff onsite
- There should be a focus on inspection inside containment (sensors, hoses, fire loading in each area/zone) and on fire protection train separation and electrical fire wrapping issues.
- Outage inspection observations and findings should be used to inform programme inspections performed later during normal plant operation.

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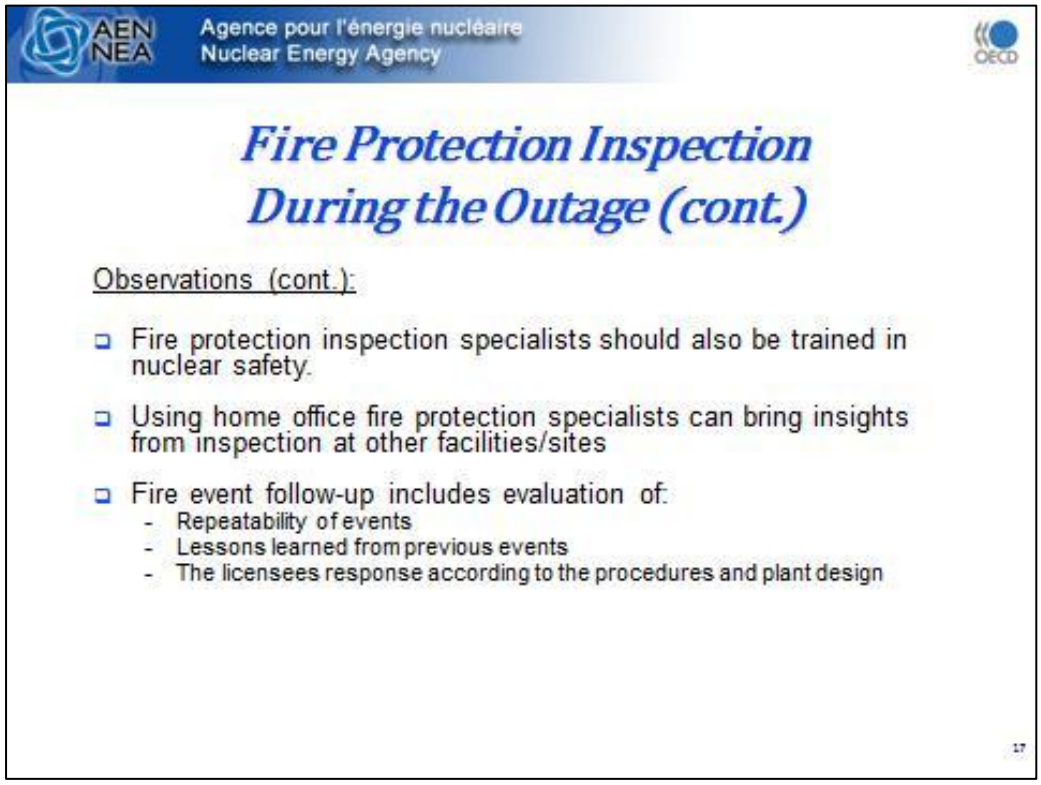
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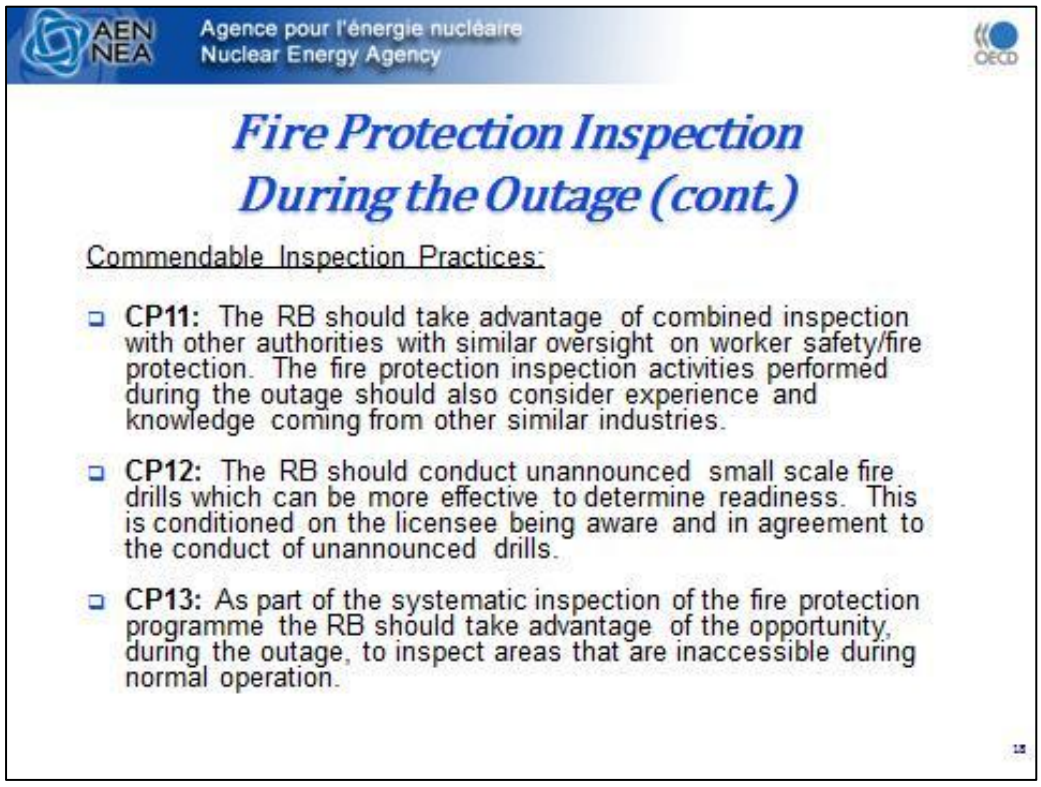
Fire Protection Inspection During the Outage (cont.)
Observations (cont.):
Fire protection inspection specialists should also be trained in nuclear safety.
Using home office fire protection specialists can bring insights from inspection at other facilities/sites
Fire event follow-up includes evaluation of:
- Repeatability of events
- Lessons learned from previous events
- The licensees response according to the procedures and plant design
17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Fire Protection Inspection During the Outage (cont.)
Commendable Inspection Practices:
CP11: The RB should take advantage of combined inspection with other authorities with similar oversight on worker safety/fire protection. The fire protection inspection activities performed during the outage should also consider experience and knowledge coming from other similar industries.
CP12: The RB should conduct unannounced small scale fire drills which can be more effective to determine readiness. This is conditioned on the licensee being aware and in agreement to the conduct of unannounced drills.
CP13: As part of the systematic inspection of the fire protection programme the RB should take advantage of the opportunity, during the outage, to inspect areas that are inaccessible during normal operation.
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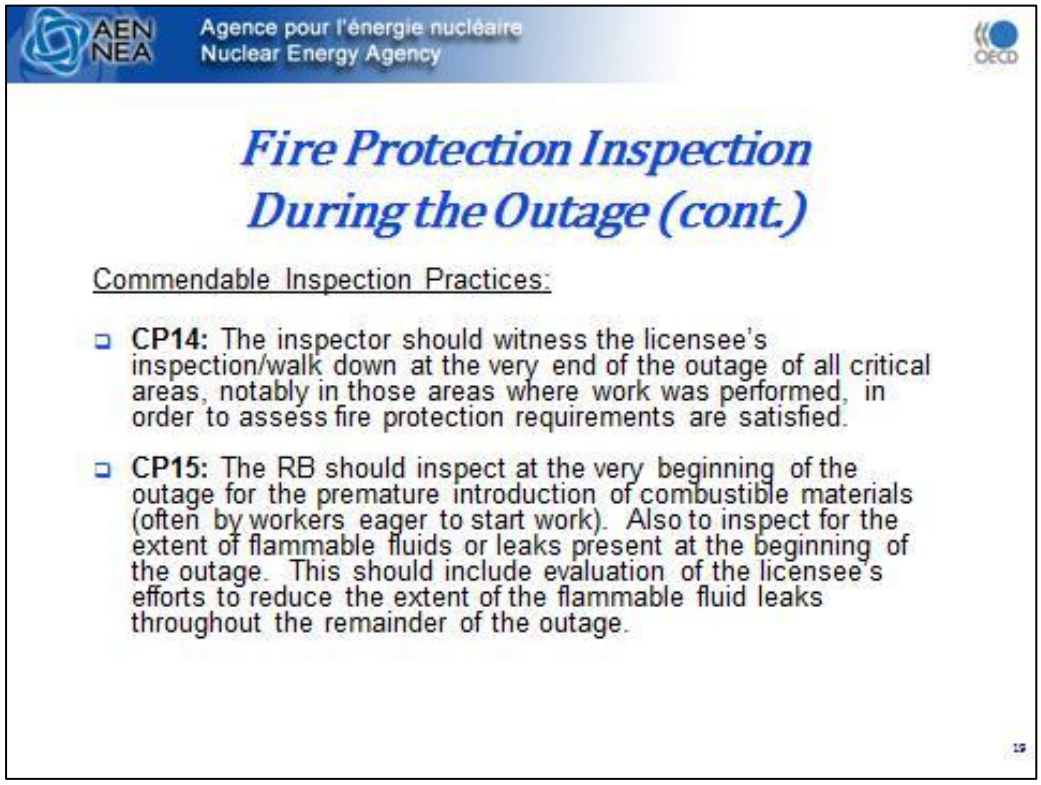
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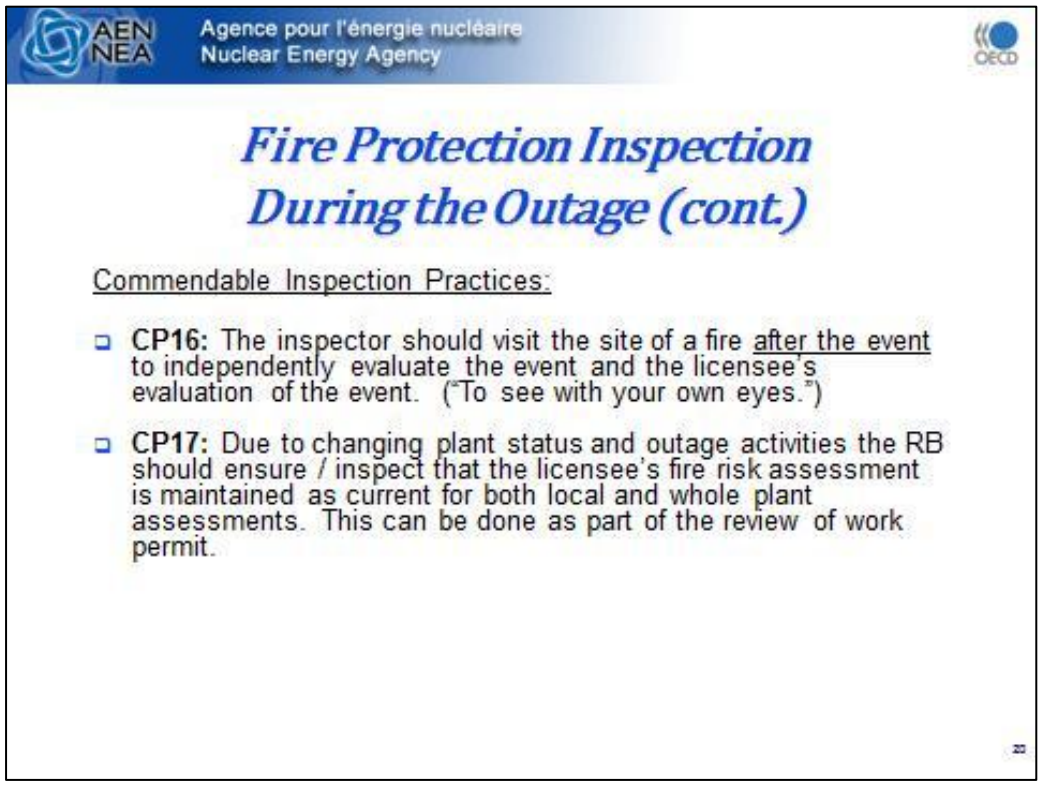
Fire Protection Inspection During the Outage (cont.)
Commendable Inspection Practices:
CP14: The inspector should witness the licensee's inspection/walk down at the very end of the outage of all critical areas, notably in those areas where work was performed, in order to assess fire protection requirements are satisfied.
CP15: The RB should inspect at the very beginning of the outage for the premature introduction of combustible materials (often by workers eager to start work). Also to inspect for the extent of flammable fluids or leaks present at the beginning of the outage. This should include evaluation of the licensee's efforts to reduce the extent of the flammable fluid leaks throughout the remainder of the outage.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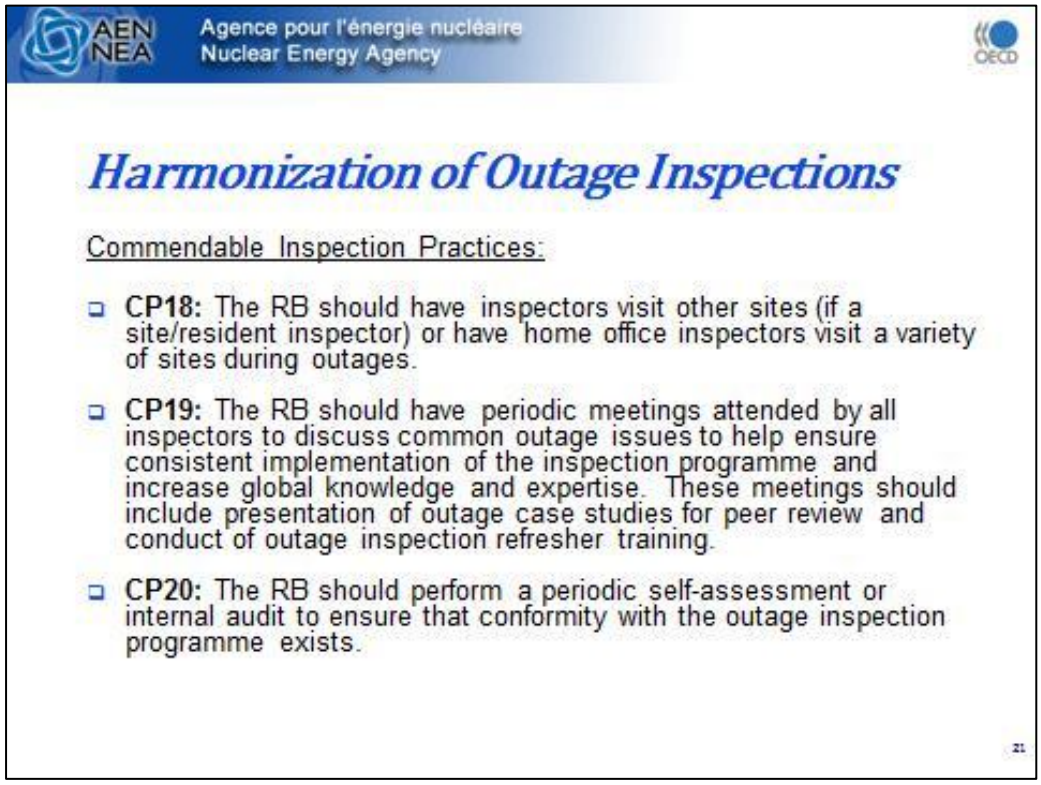
Fire Protection Inspection During the Outage (cont.)
Commendable Inspection Practices:
CP16: The inspector should visit the site of a fire after the event to independently evaluate the event and the licensee's evaluation of the event. ("To see with your own eyes.")
CP17: Due to changing plant status and outage activities the RB should ensure / inspect that the licensee's fire risk assessment is maintained as current for both local and whole plant assessments. This can be done as part of the review of work permit.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Harmonization of Outage Inspections
Commendable Inspection Practices:
CP18: The RB should have inspectors visit other sites (if a site/resident inspector) or have home office inspectors visit a variety of sites during outages.
CP19: The RB should have periodic meetings attended by all inspectors to discuss common outage issues to help ensure consistent implementation of the inspection programme and increase global knowledge and expertise. These meetings should include presentation of outage case studies for peer review and conduct of outage inspection refresher training.
CP20: The RB should perform a periodic self-assessment or internal audit to ensure that conformity with the outage inspection programme exists.
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Other Things to Consider....
Suggestion: 13th International Workshop on Inspection Practices topic – Inspection of nuclear installation modifications
Questions.....
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13. TOPIC B: EVENT RESPONSE - INSPECTIONS OPENING PRESENTATION


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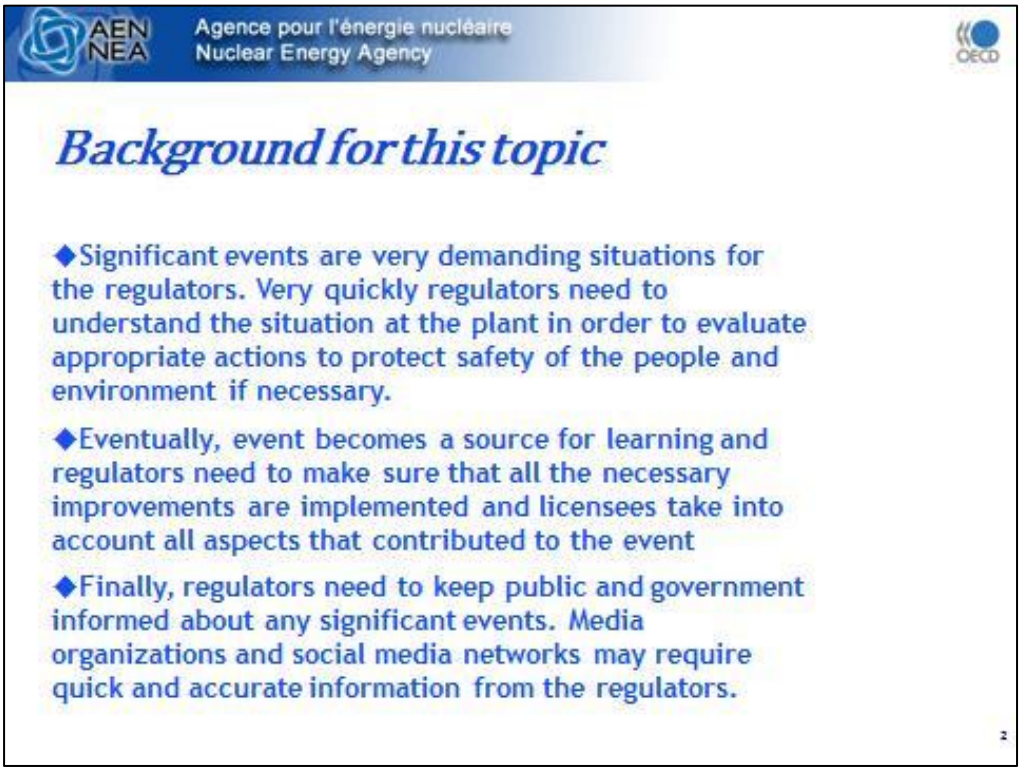
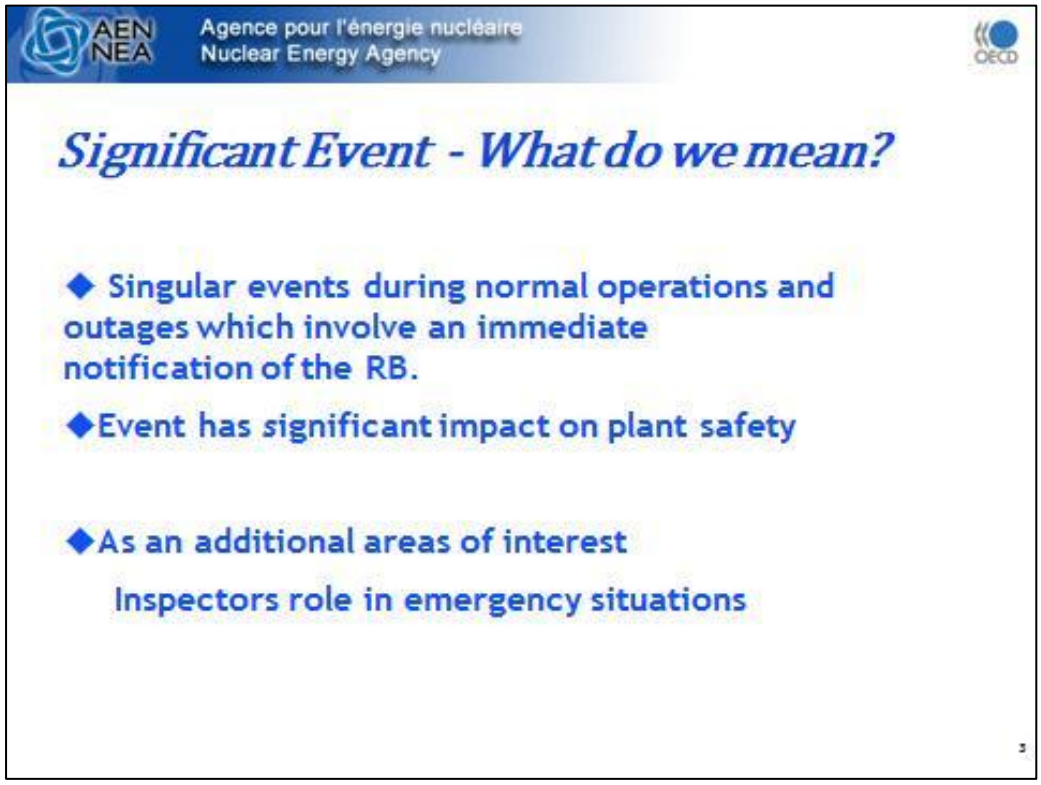
Nuclear Energy Agency
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
12th International Workshop on
Nuclear Regulatory Inspection Activities
Event Response Inspections
1


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Background for this topic
◆Significant events are very demanding situations for the regulators. Very quickly regulators need to understand the situation at the plant in order to evaluate appropriate actions to protect safety of the people and environment if necessary.
◆Eventually, event becomes a source for learning and regulators need to make sure that all the necessary improvements are implemented and licensees take into account all aspects that contributed to the event
◆Finally, regulators need to keep public and government informed about any significant events. Media organizations and social media networks may require quick and accurate information from the regulators.
2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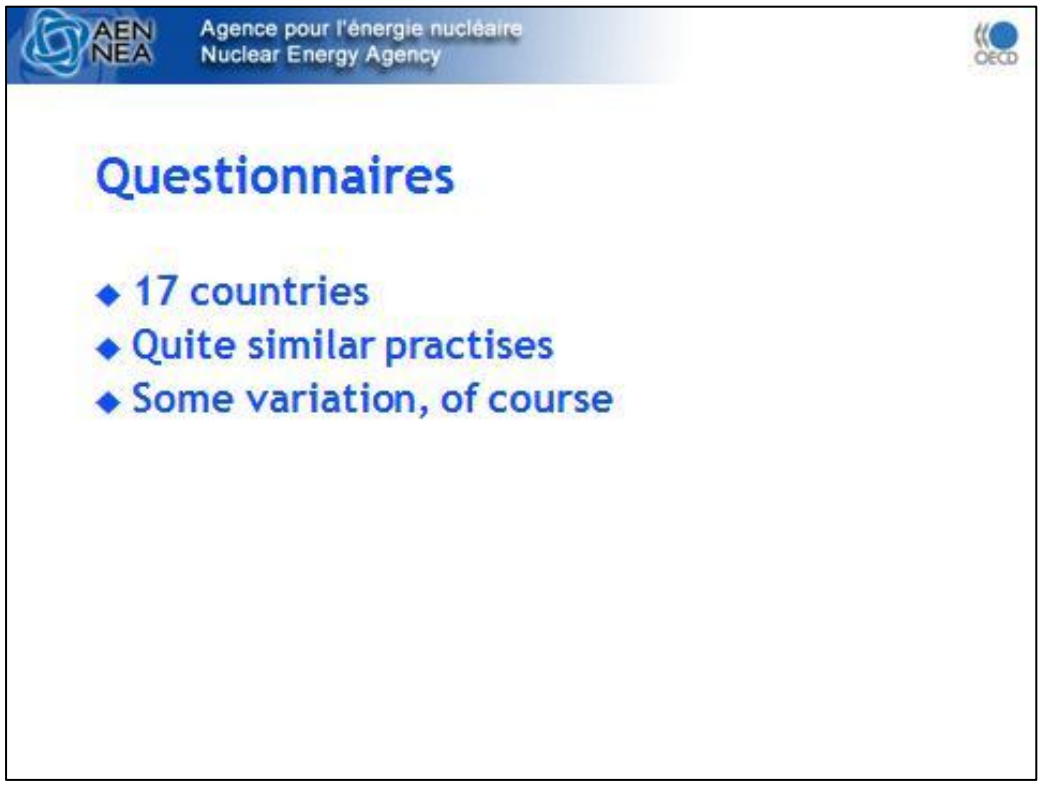
Significant Event - What do we mean?
◆ Singular events during normal operations and outages which involve an immediate notification of the RB.
◆Event has significant impact on plant safety
◆As an additional areas of interest
Inspectors role in emergency situations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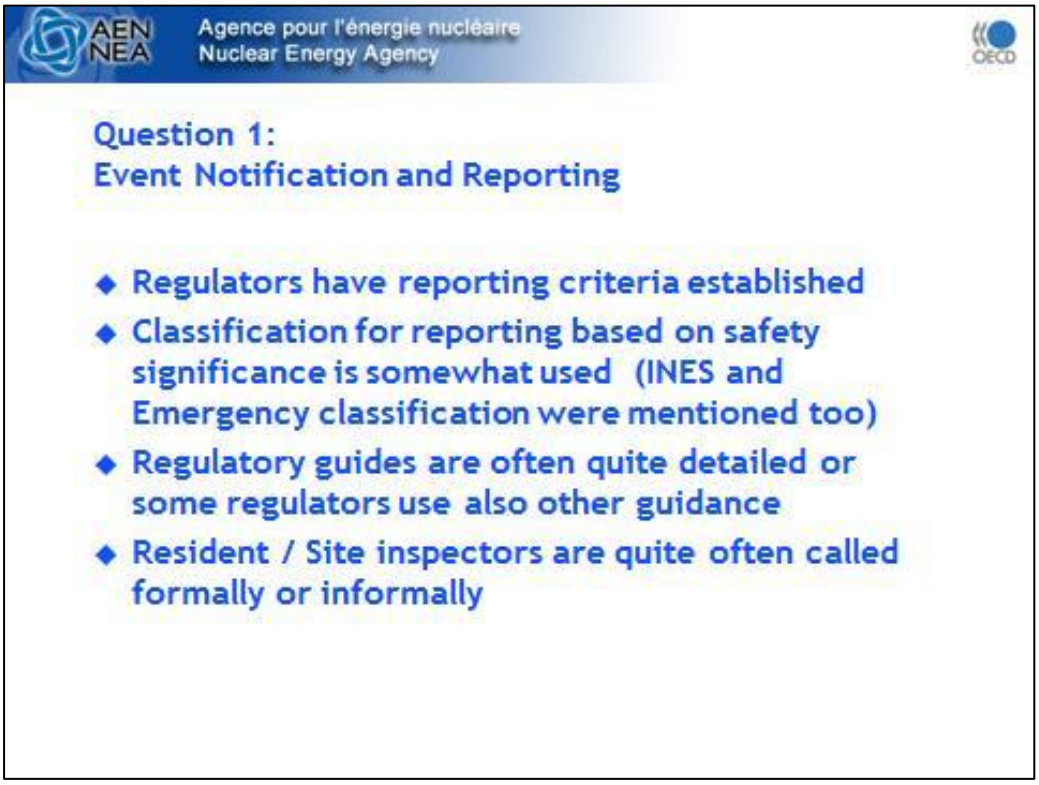
Questionnaires
◆ 17 countries
◆ Quite similar practises
◆ Some variation, of course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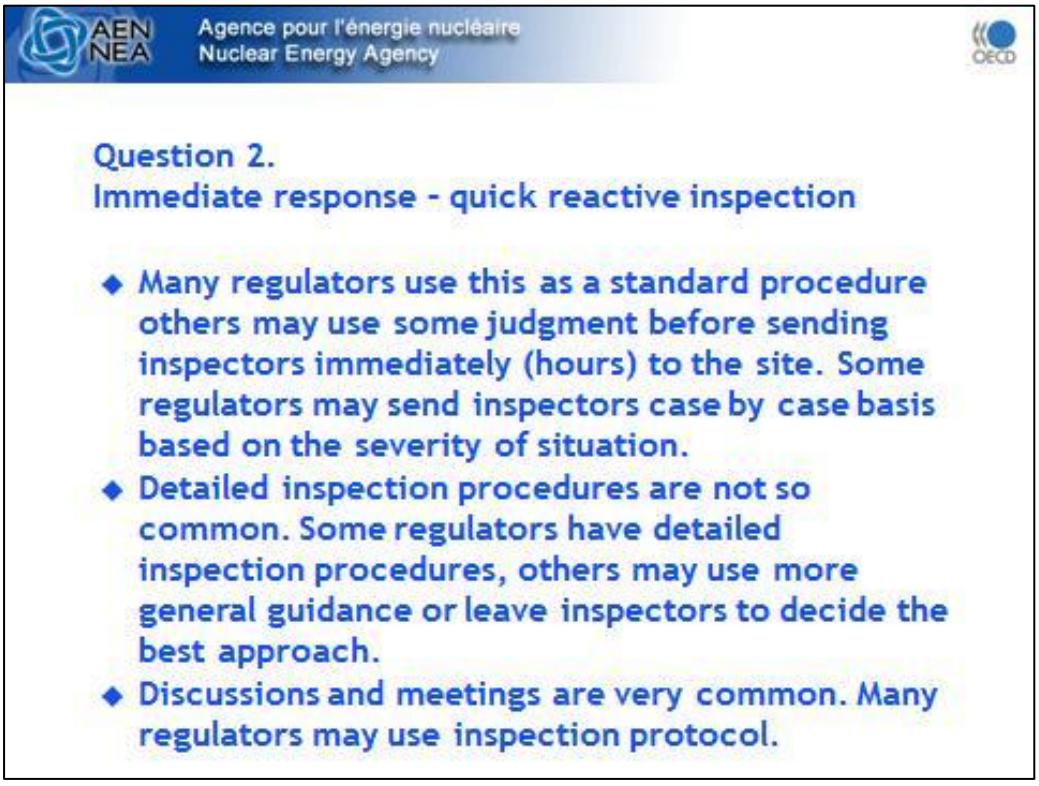
Nuclear Energy Agency
Question 1:
Event Notification and Reporting
Regulators have reporting criteria established
Classification for reporting based on safety significance is somewhat used (INES and Emergency classification were mentioned too)
Regulatory guides are often quite detailed or some regulators use also other guidance
Resident / Site inspectors are quite often called formally or informally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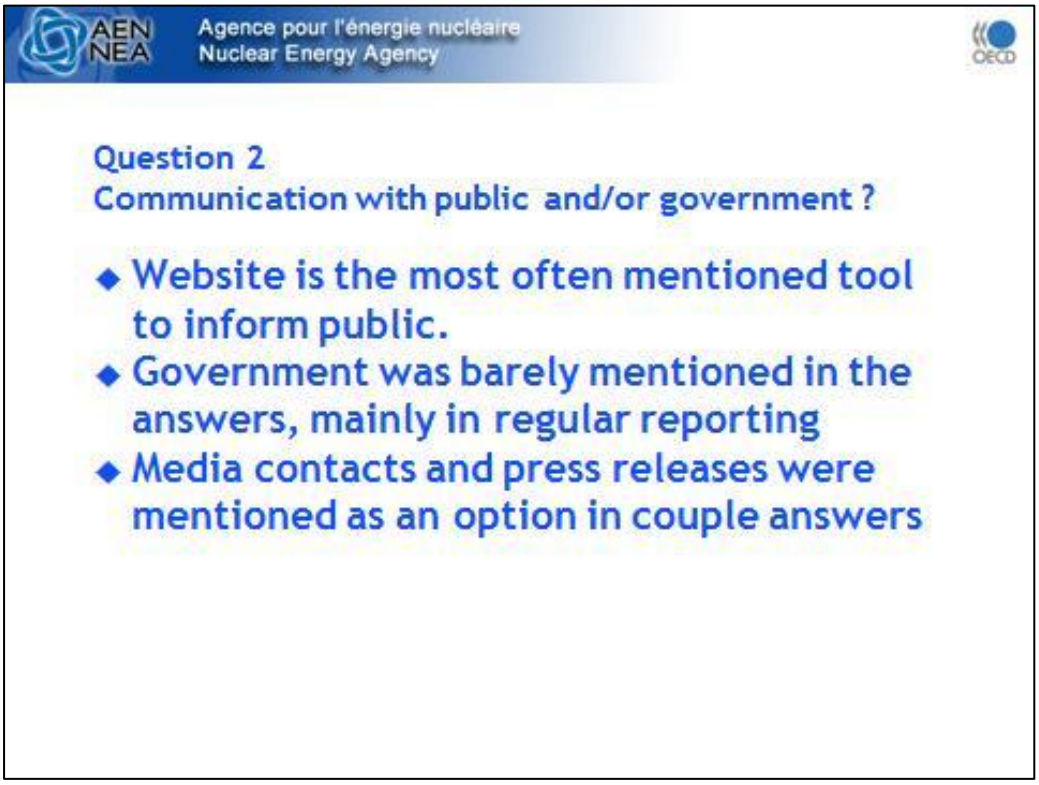
Question 2.
Immediate response - quick reactive inspection
Many regulators use this as a standard procedure others may use some judgment before sending inspectors immediately (hours) to the site. Some regulators may send inspectors case by case basis based on the severity of situation.
Detailed inspection procedures are not so common. Some regulators have detailed inspection procedures, others may use more general guidance or leave inspectors to decide the best approach.
Discussions and meetings are very common. Many regulators may use inspection protocol.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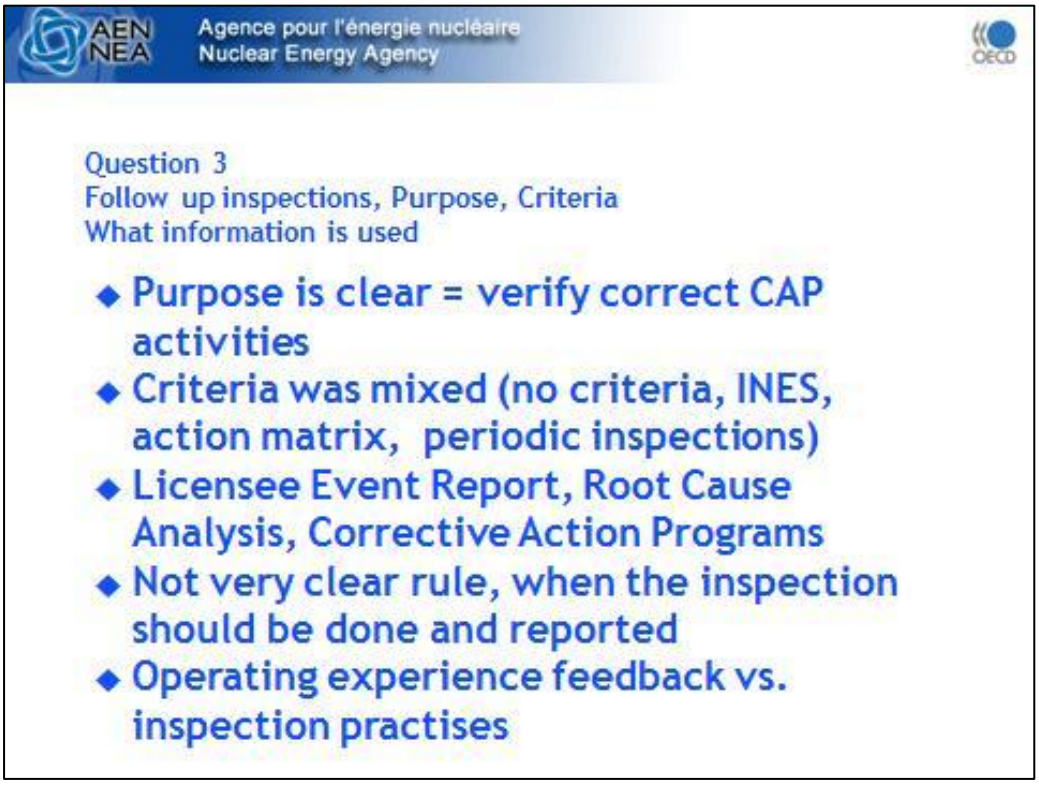
Question 2
Communication with public and/or government ?
Website is the most often mentioned tool to inform public.
Government was barely mentioned in the answers, mainly in regular reporting
Media contacts and press releases were mentioned as an option in couple answers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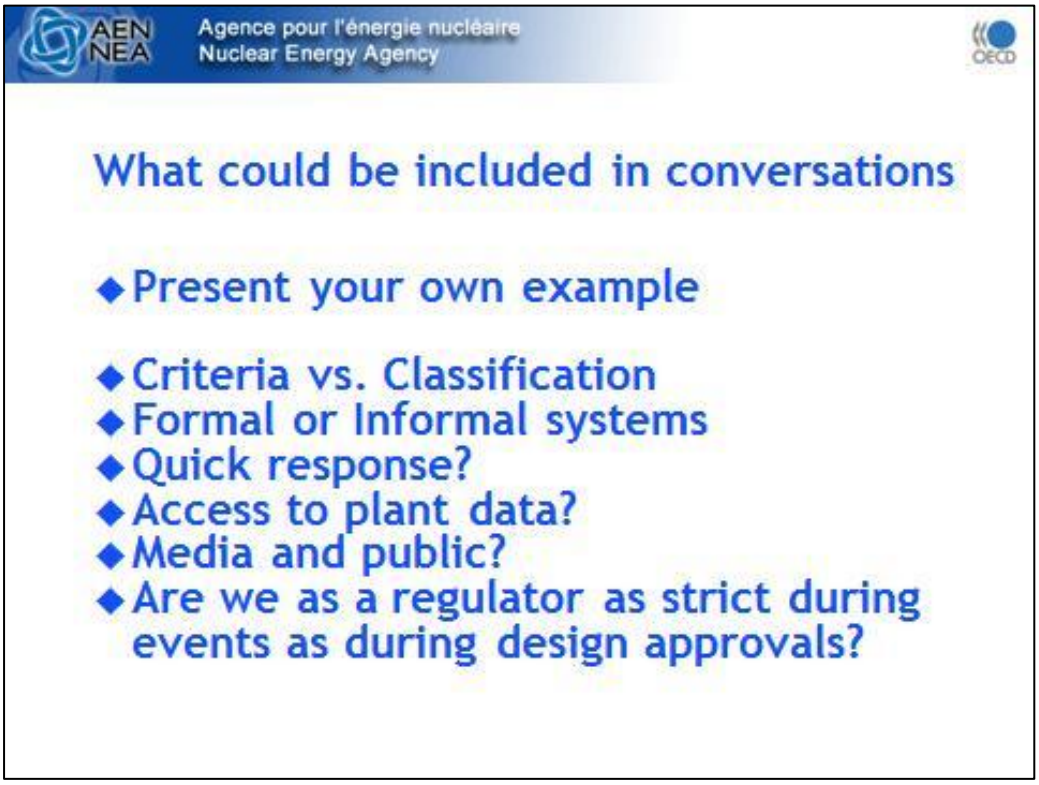
Question 3
Follow up inspections, Purpose, Criteria
What information is used
Purpose is clear = verify correct CAP activities
Criteria was mixed (no criteria, INES, action matrix, periodic inspections)
Licensee Event Report, Root Cause Analysis, Corrective Action Programs
Not very clear rule, when the inspection should be done and reported
Operating experience feedback vs. inspection practises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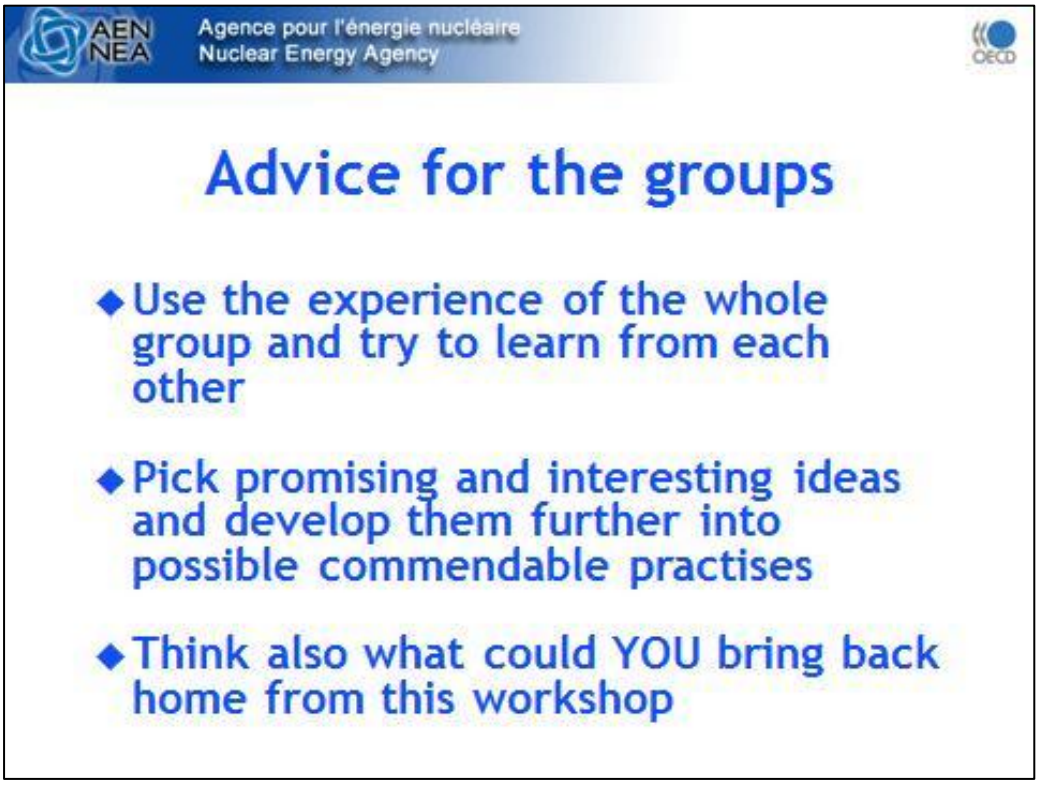
What could be included in conversations
Present your own example
Criteria vs. Classification
Formal or Informal systems
Quick response?
Access to plant data?
Media and public?
Are we as a regulator as strict during events as during design approvals?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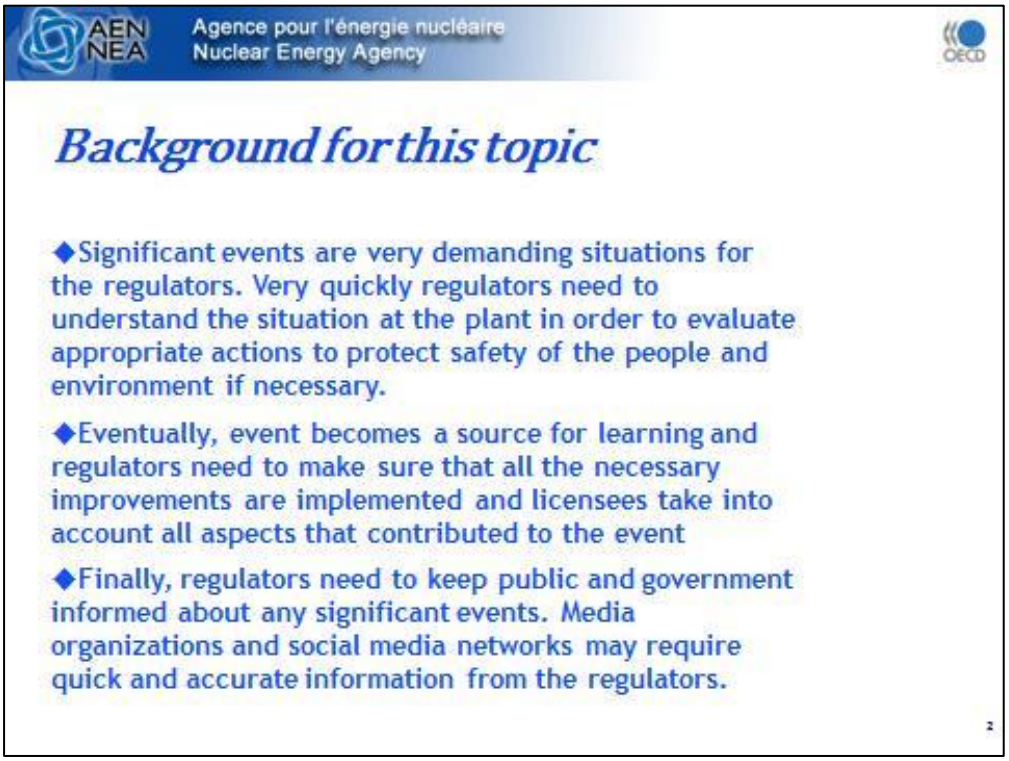
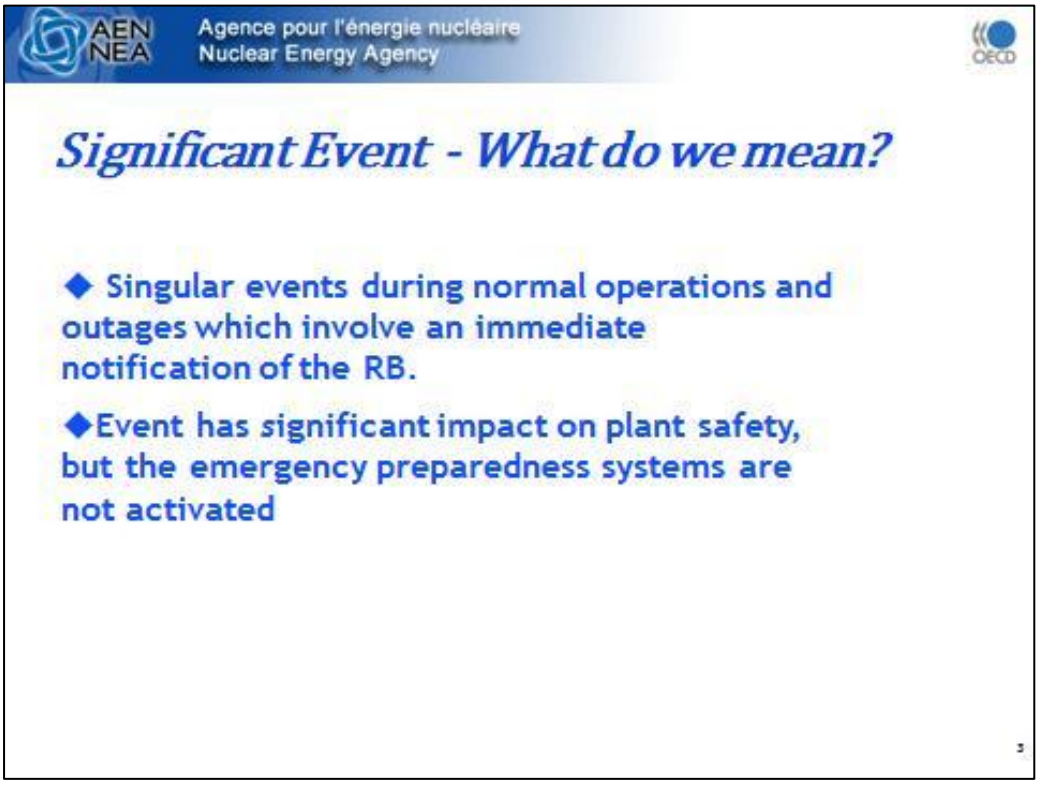
Advice for the groups
Use the experience of the whole group and try to learn from each other
Pick promising and interesting ideas and develop them further into possible commendable practises
Think also what could YOU bring back home from this workshop

14. TOPIC B: EVENT RESPONSE - INSPECTIONS CLOSING PRESENTATION


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
12th International Workshop on
Nuclear Regulatory Inspection Activities
Event Response Inspections
Chattanooga, Tennessee, USA
Hosted by the United States Nuclear Regulatory Commission
April 2014
1


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Background for this topic
◆Significant events are very demanding situations for the regulators. Very quickly regulators need to understand the situation at the plant in order to evaluate appropriate actions to protect safety of the people and environment if necessary.
◆Eventually, event becomes a source for learning and regulators need to make sure that all the necessary improvements are implemented and licensees take into account all aspects that contributed to the event
◆Finally, regulators need to keep public and government informed about any significant events. Media organizations and social media networks may require quick and accurate information from the regulators.
2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Significant Event - What do we mean?
◆ Singular events during normal operations and outages which involve an immediate notification of the RB.
◆Event has significant impact on plant safety, but the emergency preparedness systems are not activated
3


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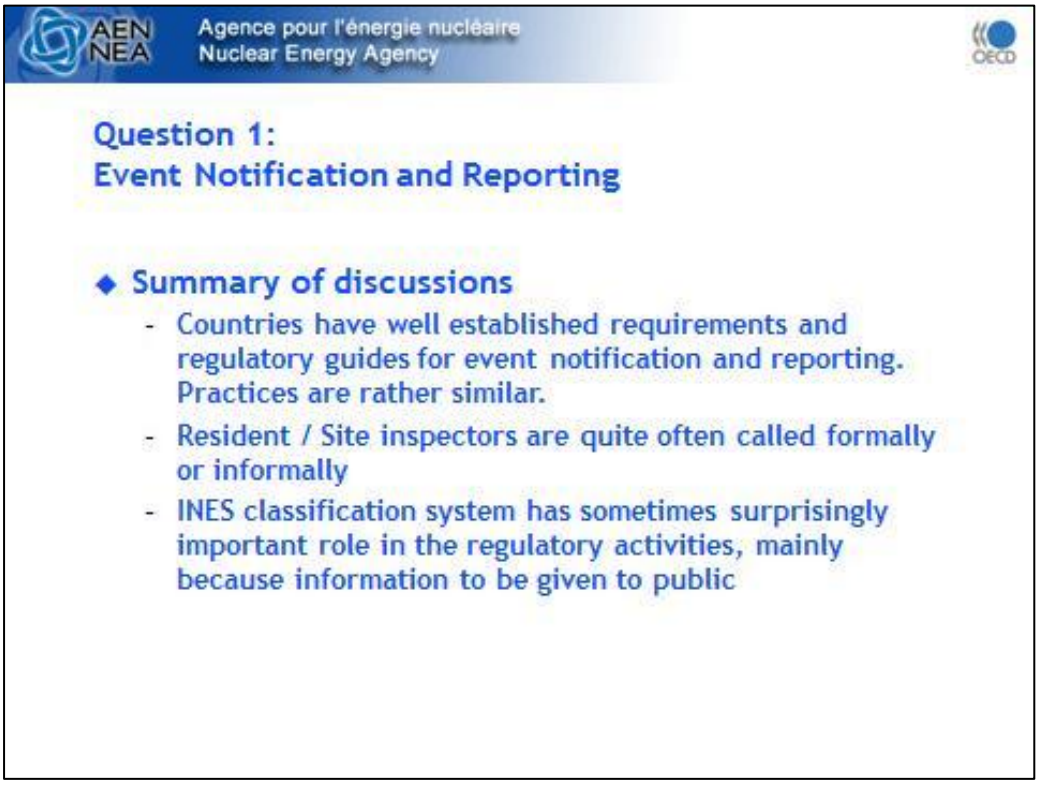
Discussion Areas
1. Event Notification and Reporting
2. Immediate response
◆ Quick reactive inspection
◆ Communication with stakeholders
3. Follow up inspections
4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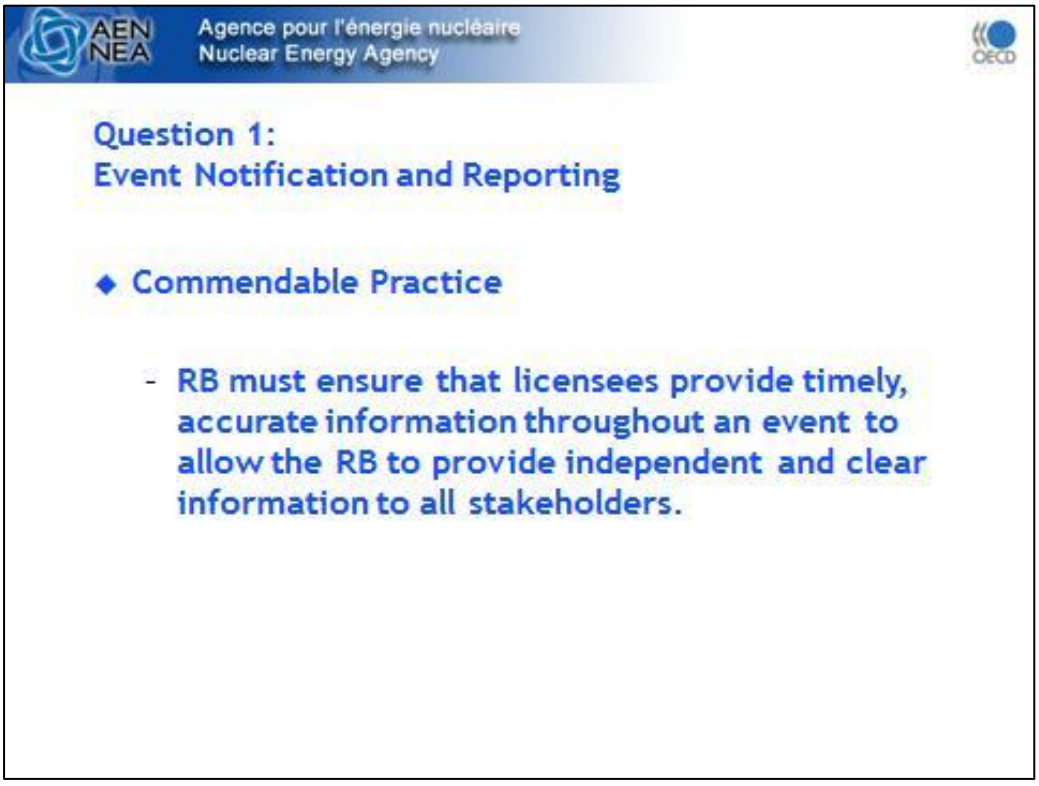
Nuclear Energy Agency
Question 1:
Event Notification and Reporting
Summary of discussions
- Countries have well established requirements and regulatory guides for event notification and reporting. Practices are rather similar.
- Resident / Site inspectors are quite often called formally or informally
- INES classification system has sometimes surprisingly important role in the regulatory activities, mainly because information to be given to public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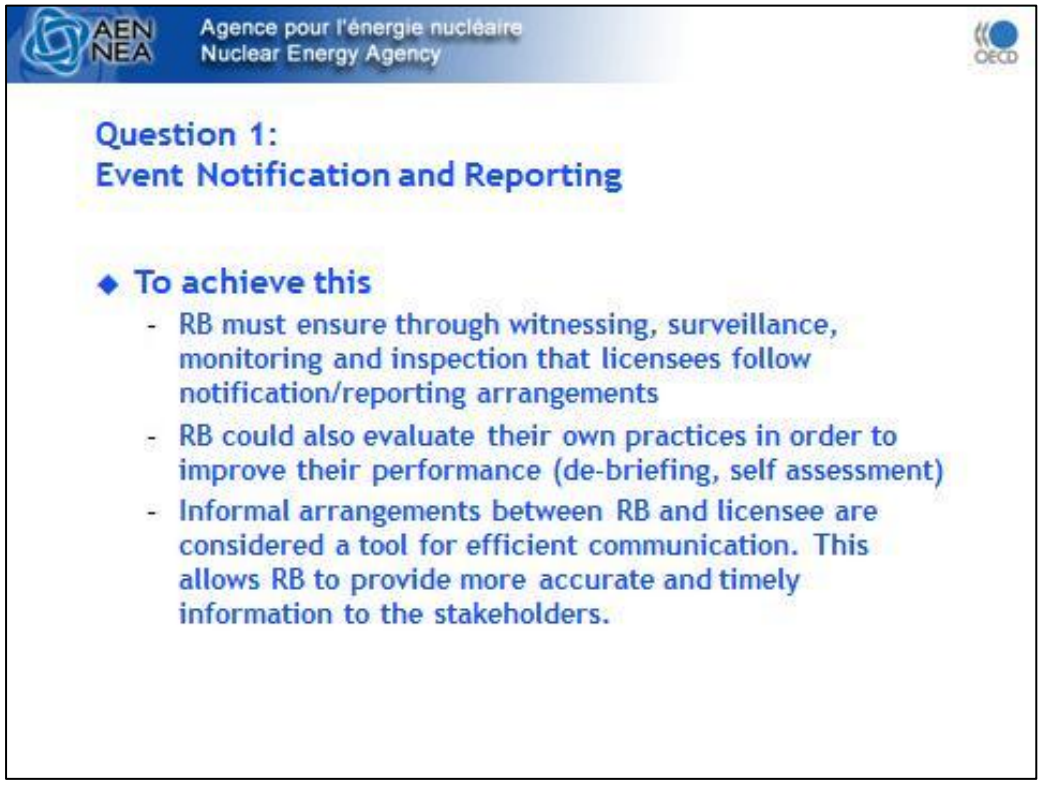
Question 1:
Event Notification and Reporting
Commendable Practice
- RB must ensure that licensees provide timely, accurate information throughout an event to allow the RB to provide independent and clear information to all stakeholders.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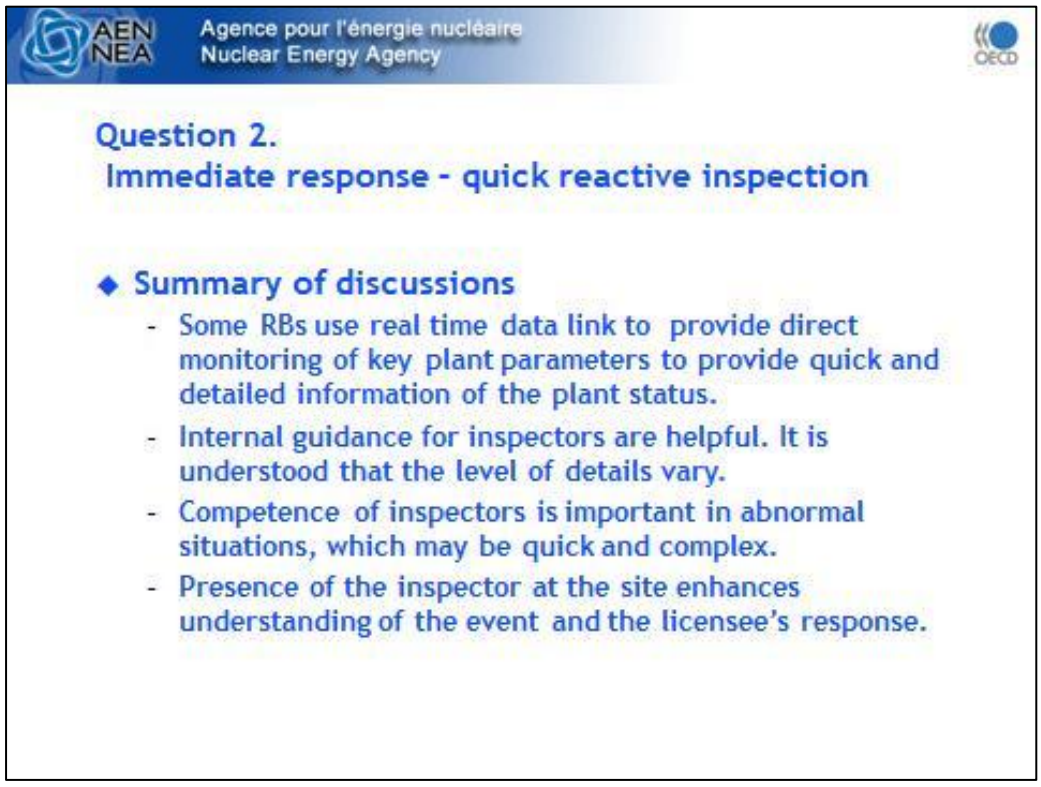
Question 1:
Event Notification and Reporting
To achieve this
- RB must ensure through witnessing, surveillance, monitoring and inspection that licensees follow notification/reporting arrangements
- RB could also evaluate their own practices in order to improve their performance (de-briefing, self assessment)
- Informal arrangements between RB and licensee are considered a tool for efficient communication. This allows RB to provide more accurate and timely information to the stakeholders.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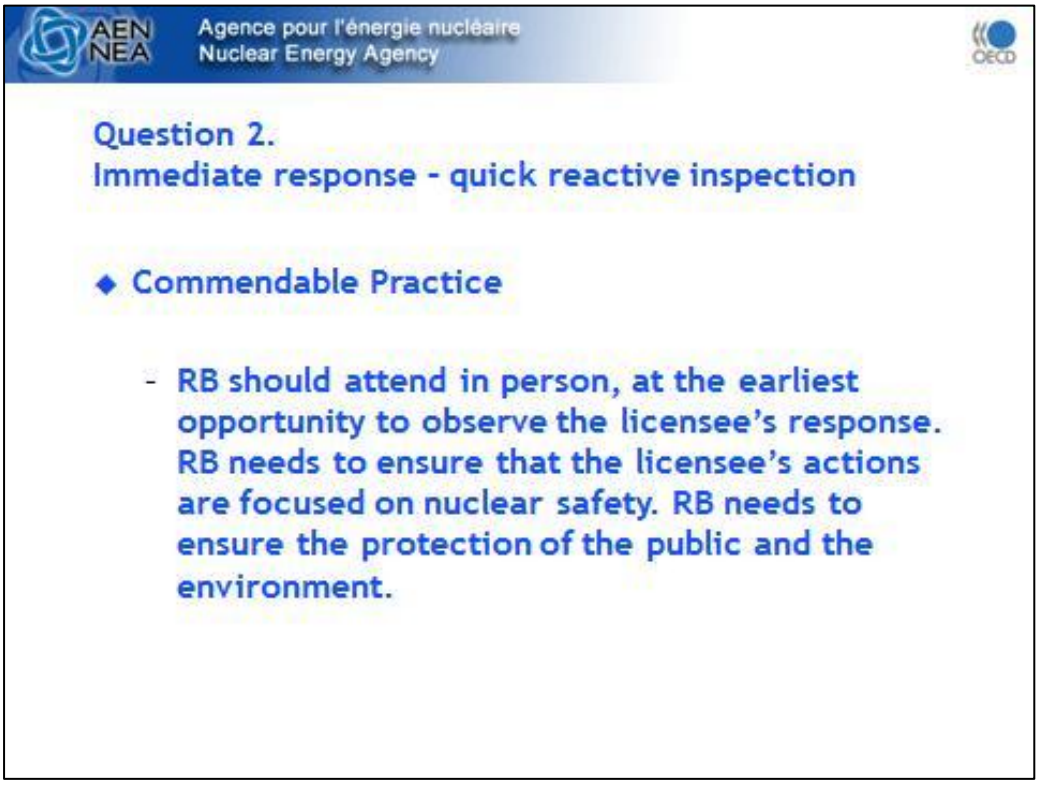
Question 2.
Immediate response - quick reactive inspection
Summary of discussions
- Some RBs use real time data link to provide direct monitoring of key plant parameters to provide quick and detailed information of the plant status.
- Internal guidance for inspectors are helpful. It is understood that the level of details vary.
- Competence of inspectors is important in abnormal situations, which may be quick and complex.
- Presence of the inspector at the site enhances understanding of the event and the licensee's response.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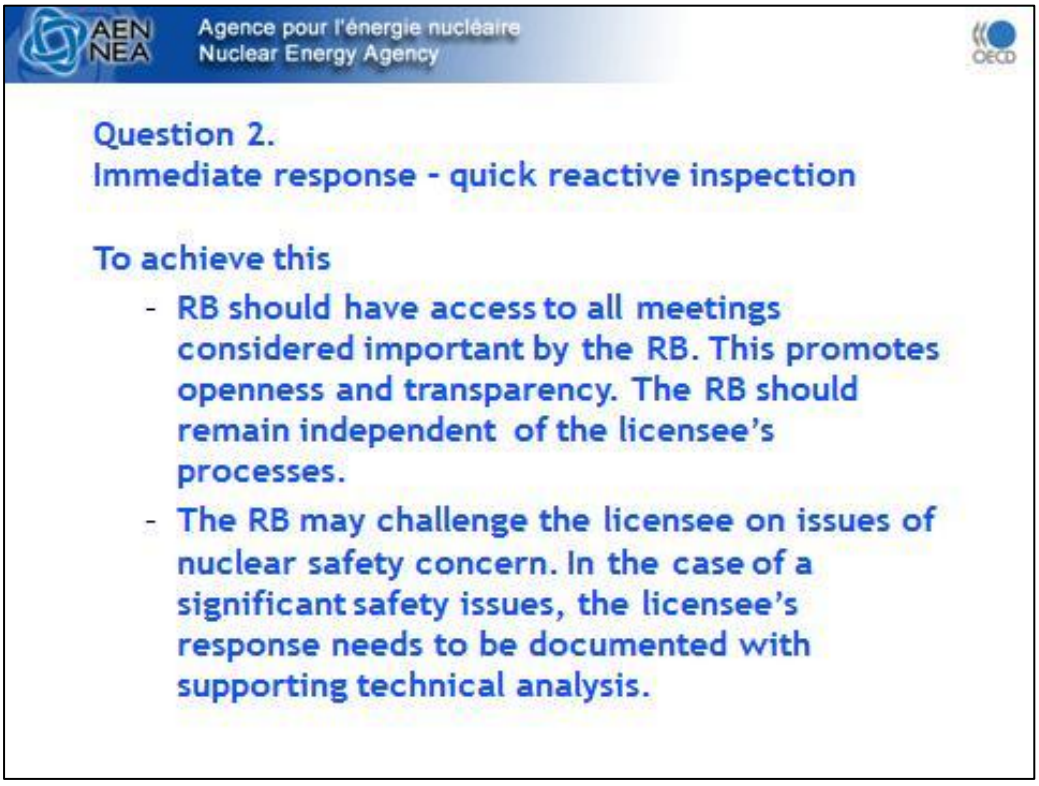
Question 2.
Immediate response - quick reactive inspection
◆ Commendable Practice
- RB should attend in person, at the earliest opportunity to observe the licensee's response. RB needs to ensure that the licensee's actions are focused on nuclear safety. RB needs to ensure the protection of the public and the environment.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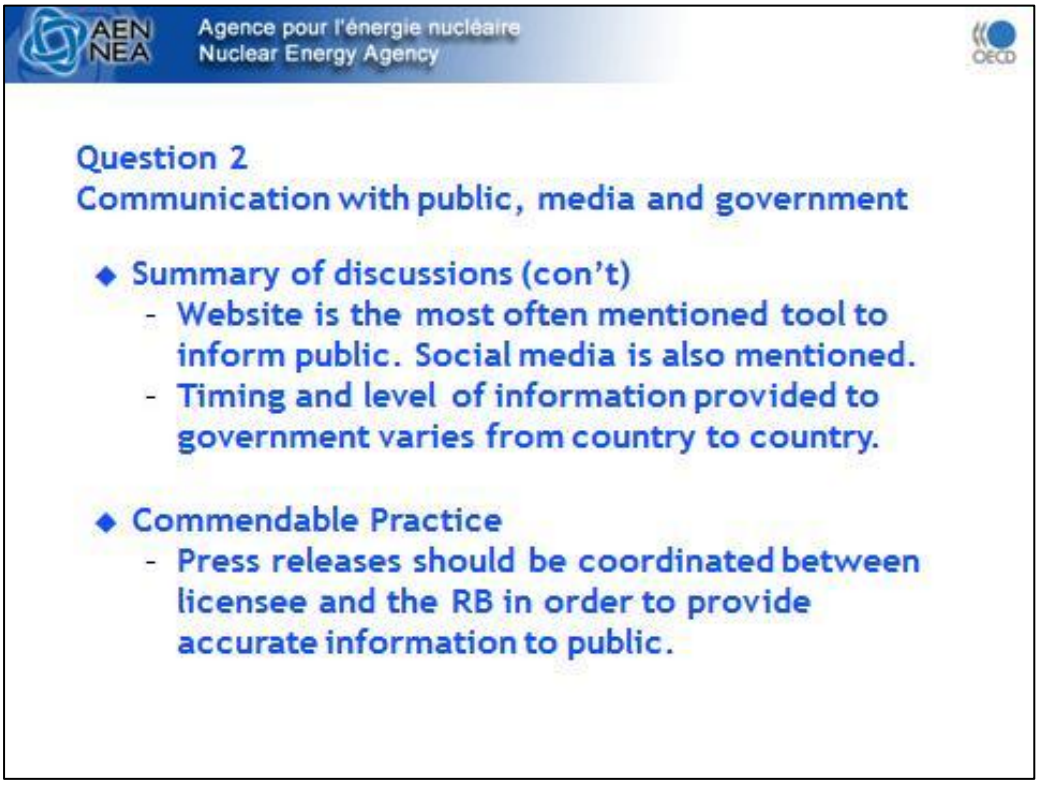
Question 2.
Immediate response - quick reactive inspection
To achieve this
- RB should have access to all meetings considered important by the RB. This promotes openness and transparency. The RB should remain independent of the licensee's processes.
- The RB may challenge the licensee on issues of nuclear safety concern. In the case of a significant safety issues, the licensee's response needs to be documented with supporting technical analysis.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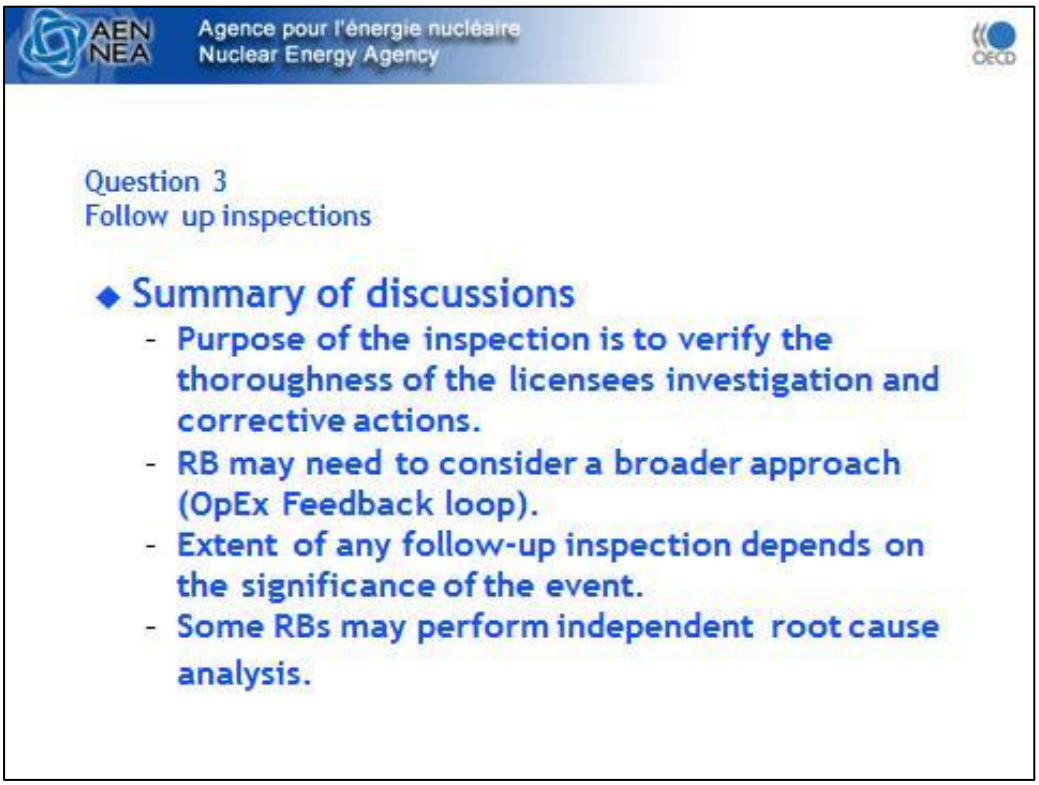
Question 2
Communication with public, media and government
Summary of discussions (con't)
- Website is the most often mentioned tool to inform public. Social media is also mentioned.
- Timing and level of information provided to government varies from country to country.
Commendable Practice
- Press releases should be coordinated between licensee and the RB in order to provide accurate information to public.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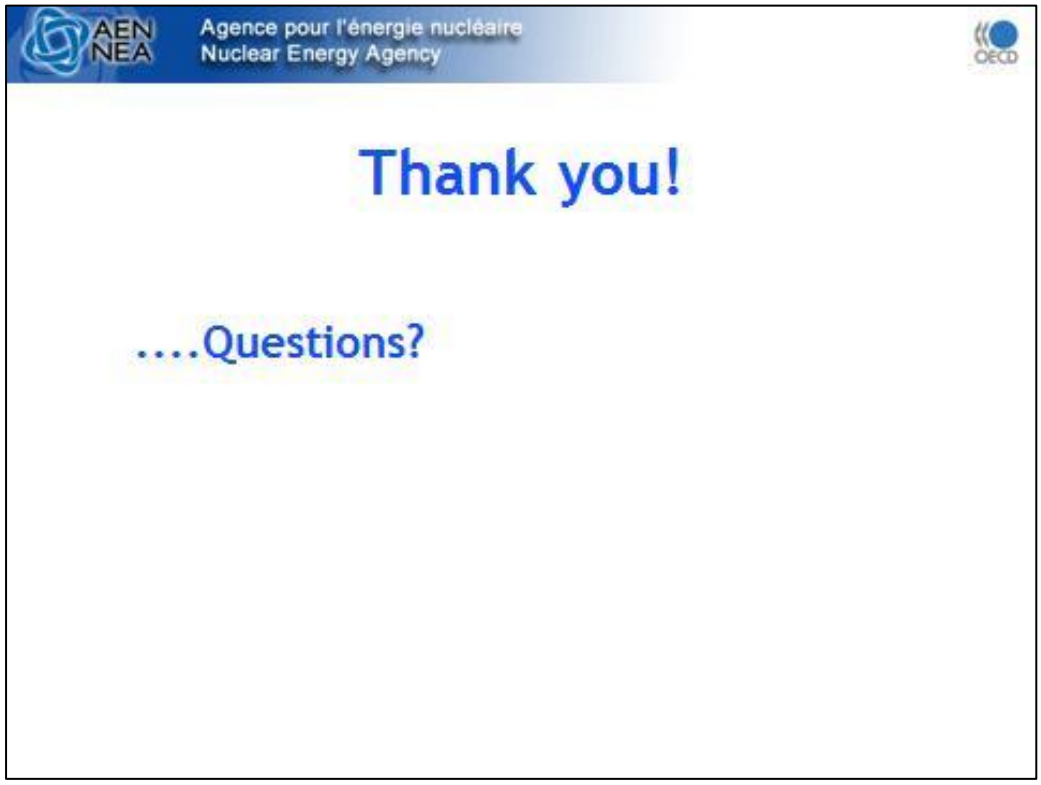
Question 3
Follow up inspections
Summary of discussions
- Purpose of the inspection is to verify the thoroughness of the licensees investigation and corrective actions.
- RB may need to consider a broader approach (OpEx Feedback loop).
- Extent of any follow-up inspection depends on the significance of the event.
- Some RBs may perform independent root cause analysis.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Thank you!
....Questions?

15. TOPIC C: THE IMPACT ON INSPECTION PROGRAMMES OF THE FUKUSHIMA DAIICHI NPP ACCIDENT - OPENING PRESENTATION


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Impact on Inspection Programmes of the Fukushima Accident
Committee on Nuclear Regulatory Activities (CNRA)
Working Group on Inspection Practices (WGIP)
12th International Nuclear Regulatory Inspection Workshop
Leader: Alex Leblanc, Canada
Co-Leader: Arvind Garg, India
Hosted by USNRC
Chattanooga, Tennessee, USA: April 7-9, 2014


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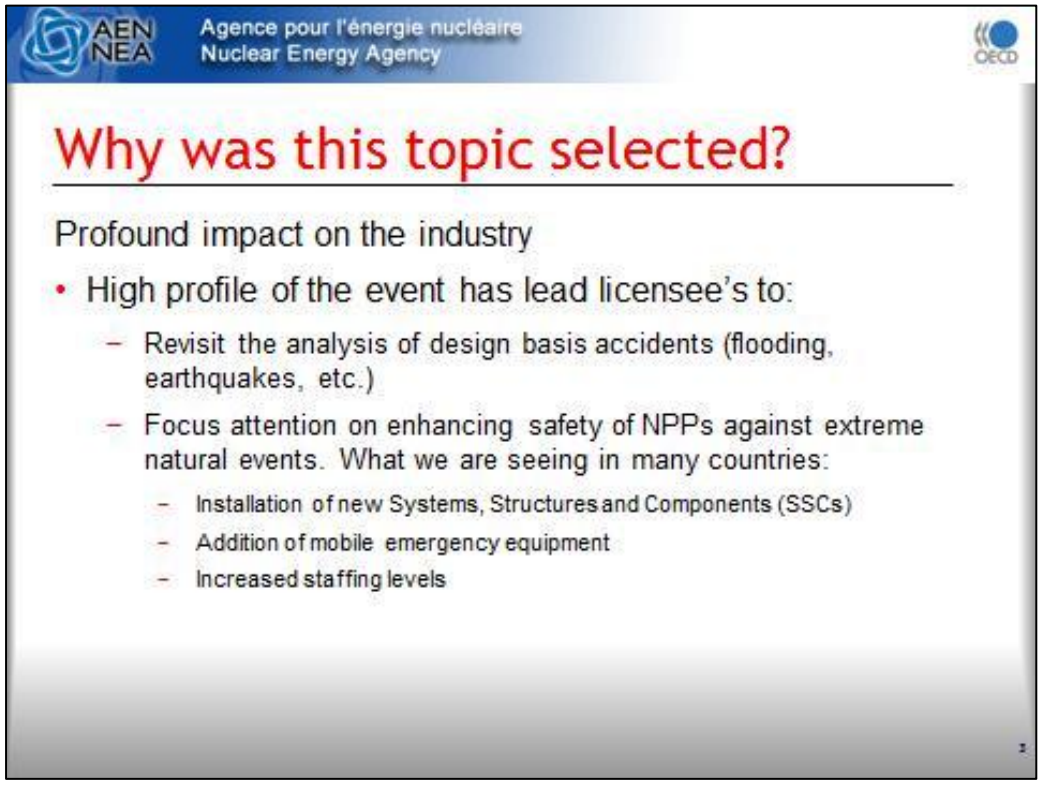
Introduction
• WGIP exists to facilitate the exchange of information and experience related to regulatory safety inspections between member countries.
• The next few days will allow each of us to share what our respective regulatory bodies (RB) are doing in the wake of the Fukushima Daiichi accident.
• Other groups will be discussing
– Outage Activities + Fire Protection Inspections
– Event Response Inspections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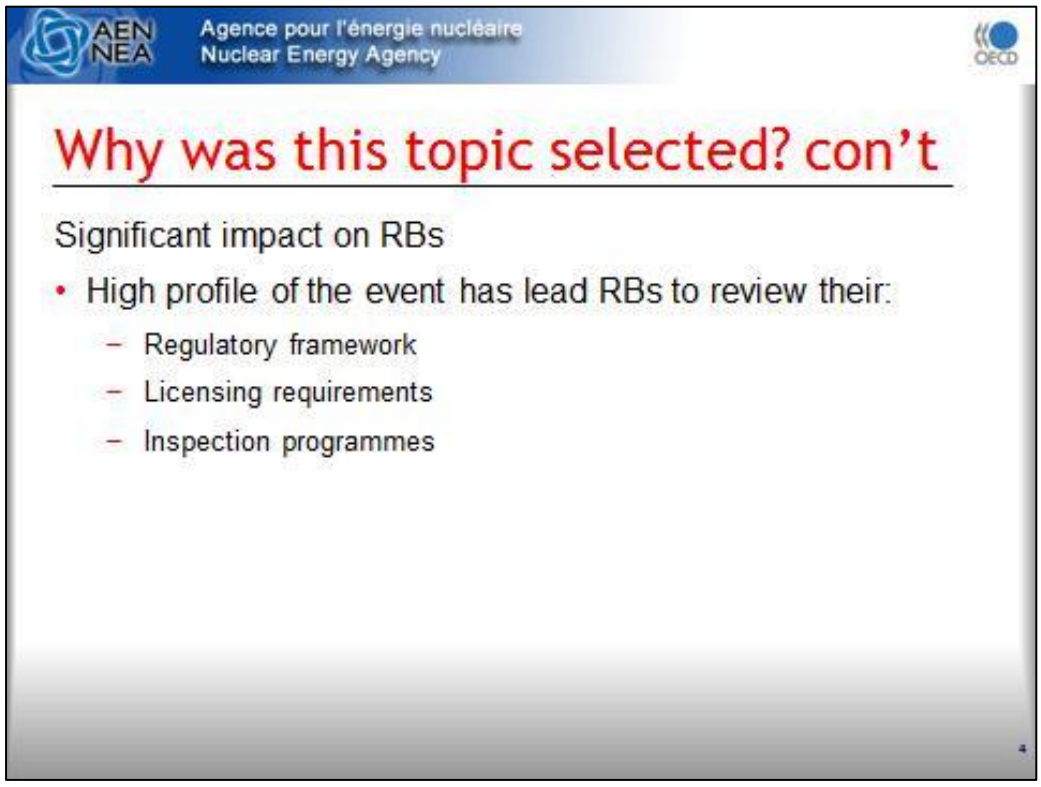
Why was this topic selected?
Profound impact on the industry
• High profile of the event has lead licensee's to:
– Revisit the analysis of design basis accidents (flooding, earthquakes, etc.)
– Focus attention on enhancing safety of NPPs against extreme natural events. What we are seeing in many countries:
– Installation of new Systems, Structures and Components (SSCs)
– Addition of mobile emergency equipment
– Increased staffing levels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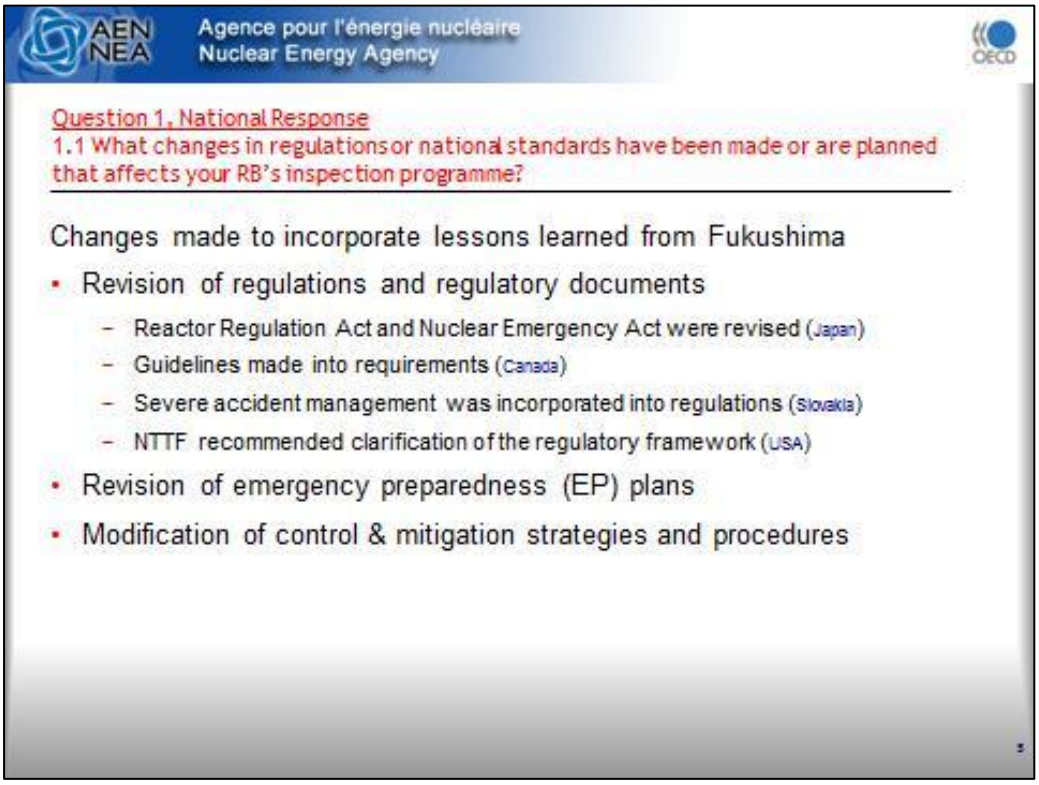
Why was this topic selected? con't
Significant impact on RBs
• High profile of the event has lead RBs to review their:
– Regulatory framework
– Licensing requirements
– Inspection programmes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Question 1, National Response
1.1 What changes in regulations or national standards have been made or are planned that affects your RB's inspection programme?
Changes made to incorporate lessons learned from Fukushima
• Revision of regulations and regulatory documents
– Reactor Regulation Act and Nuclear Emergency Act were revised (Japan)
– Guidelines made into requirements (Canada)
– Severe accident management was incorporated into regulations (Slovakia)
– NTTF recommended clarification of the regulatory framework (USA)
• Revision of emergency preparedness (EP) plans
• Modification of control & mitigation strategies and procedures


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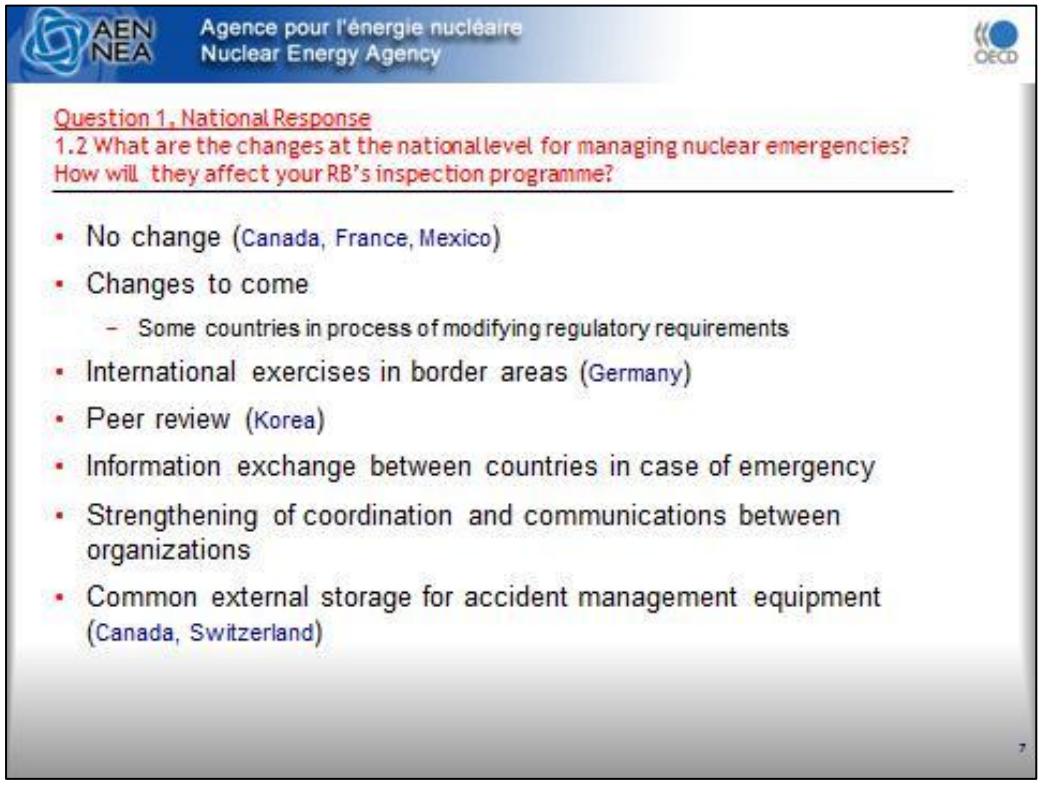
Question 1, National Response
1.1 What changes in regulations or national standards have been made or are planned that affects your RB's inspection programme?
Effect on RB's inspection programme
• No change at all (Mexico, Sweden)
• Addition of focused and one-off type inspections (Spain, Switzerland)
– Follow-up of implementation & verification of new SSCs
– Inspection of coping strategies for flooding and station blackouts (SBO)
• Doesn't seem to be any changes to baseline inspection programmes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Question 1, National Response
1.2 What are the changes at the national level for managing nuclear emergencies? How will they affect your RB's inspection programme?
• No change (Canada, France, Mexico)
• Changes to come
– Some countries in process of modifying regulatory requirements
• International exercises in border areas (Germany)
• Peer review (Korea)
• Information exchange between countries in case of emergency
• Strengthening of coordination and communications between organizations
• Common external storage for accident management equipment (Canada, Switzerland)


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Question 1, National Response
1.2 What are the changes at the national level for managing nuclear emergencies? How will they affect your RB's inspection programme?
Effect on RB's inspection programme
• In some cases, too early to tell; new regulatory requirements still being developed and implemented
• For most part, EP exercises already inspected by RBs
– NRA now inspects licensee nuclear emergency response drills (Japan)


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Question 1, National Response
1.3 Have any changes in the RB's organization been made/planned post Fukushima? How will these changes affect your RB's inspection programme?
• No changes (Belgium, Canada, France, Germany, India, Mexico, Slovakia, Slovenia, Spain, Sweden)
• Improved available manning levels for handling emergencies (Finland, UK)
• NSSC established as an independent regulatory body (Korea)
– Regional offices are being opened
• NRC established directorates to manage actions related to lessons learned from Fukushima (USA)
• Nuclear Regulatory Authority established (Japan)
→ Organizational changes have had no major impact on RB's inspection programme


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Question 2, Licensee Emergency Programmes
2.1 Are there any changes in the licensee's emergency preparedness programme? What impact will they have on your RB's inspection programme?
• Addition of SSCs to handle emergencies
– Standby facilities to house emergency mitigating equipment for each NPP site (Canada)
– Creation of Nuclear Rapid Intervention Force (France)
– Common external storage (Canada, Switzerland)
– Construction of a hardened emergency facility (UK)
• Revision of procedures
– Procedures updated to reflect new regulatory requirements
– Procedures updated for multi-unit events (Belgium, Slovakia, Sweden)
→ Slight modification of existing baseline inspections (Canada, Germany) and focused inspections (Switzerland, UK)

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Question 2, Licensee Emergency Programmes
2.2 Changes in the licensee's organizational structure post Fukushima?
2.3 Changes in NPP's minimum complement of staff in view of Fukushima?

Q2.2

- Candu Industry Implementation Team (Canada)
- Separation of EP work from operational safety management (Japan)
- Emergency response for multi-unit events
- Additional manpower (operators, EP personnel, SAMG specialist)
- Improvement in means of communication (Russia)

Q2.3

- No change for most countries
- Increase in complement – operators, EP personnel (Japan, Spain, UK)

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Question 3, Technical or engineering changes to plant
3.1 Changes wrt SAMG assessments (flood, seismic levels - active and passive faults); and supporting facilities post Fukushima? Changes in inspection programme required?

- Ranges from no change to re-assessment of design basis accidents (DBA) such as flooding, earthquakes & tsunamis
- Development/implementation of SAMGs is on going

→ Changes made to RB's inspection programme

- No change
- Focused inspections
- One-off inspections
- Slight modification of existing baseline inspections (Canada)
- New baseline inspections? (Japan, Slovakia)

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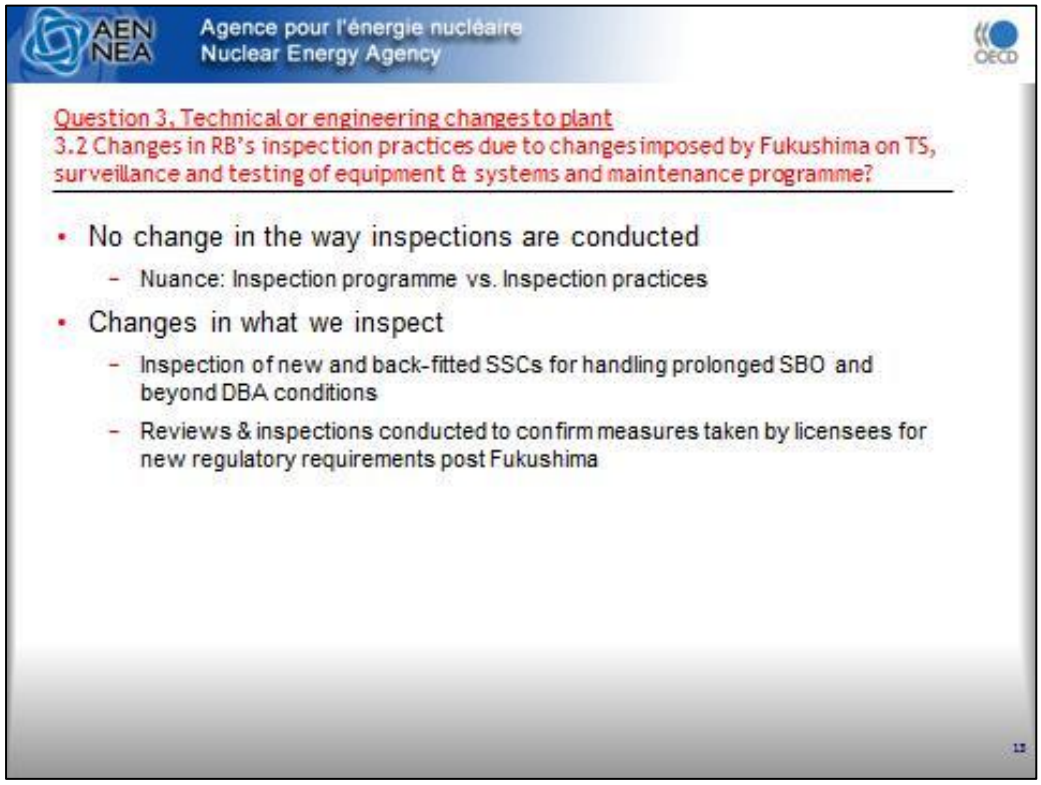
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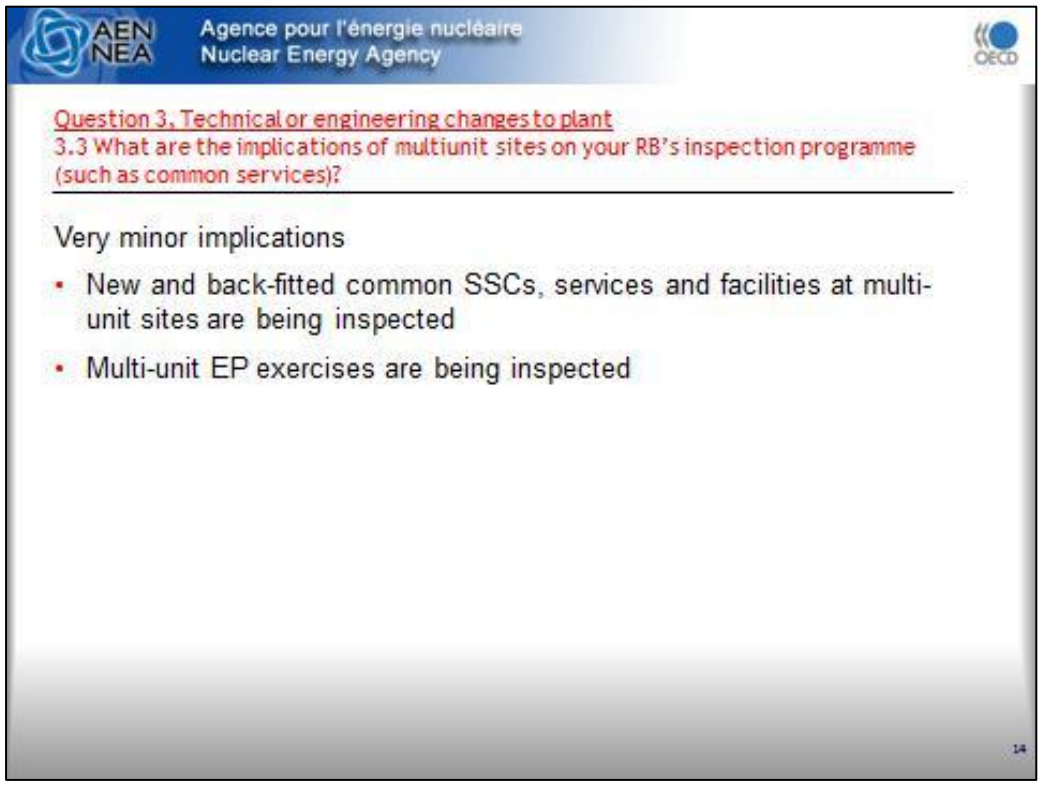
Question 3, Technical or engineering changes to plant
3.2 Changes in RB's inspection practices due to changes imposed by Fukushima on TS, surveillance and testing of equipment & systems and maintenance programme?
• No change in the way inspections are conducted
– Nuance: Inspection programme vs. Inspection practices
• Changes in what we inspect
– Inspection of new and back-fitted SSCs for handling prolonged SBO and beyond DBA conditions
– Reviews & inspections conducted to confirm measures taken by licensees for new regulatory requirements post Fukushima
13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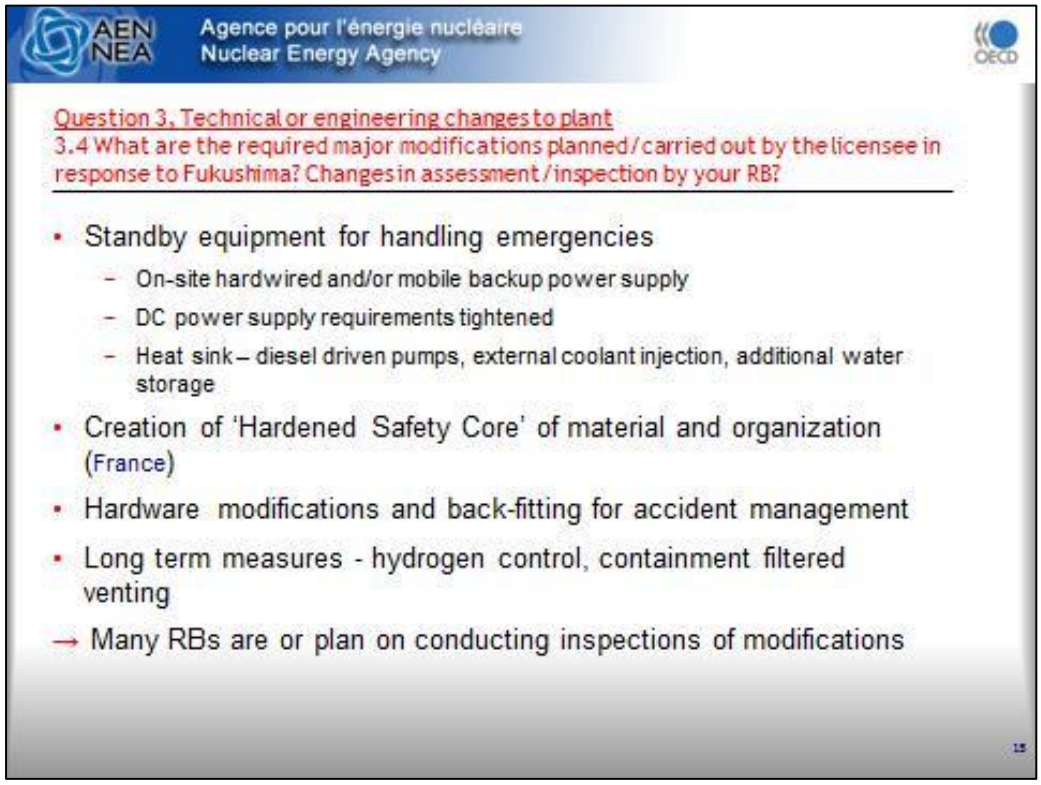
Question 3, Technical or engineering changes to plant
3.3 What are the implications of multiunit sites on your RB's inspection programme (such as common services)?
Very minor implications
• New and back-fitted common SSCs, services and facilities at multi-unit sites are being inspected
• Multi-unit EP exercises are being inspected
14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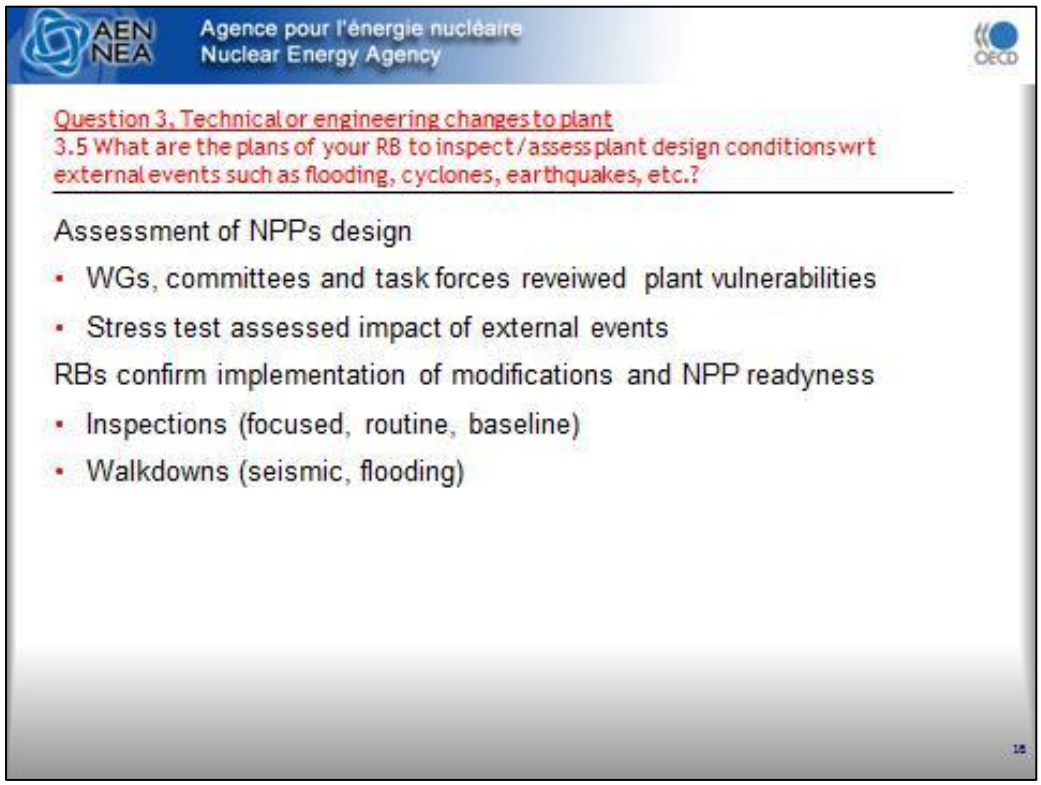
Question 3, Technical or engineering changes to plant
3.4 What are the required major modifications planned/carried out by the licensee in response to Fukushima? Changes in assessment/inspection by your RB?
• Standby equipment for handling emergencies
– On-site hardwired and/or mobile backup power supply
– DC power supply requirements tightened
– Heat sink – diesel driven pumps, external coolant injection, additional water storage
• Creation of 'Hardened Safety Core' of material and organization (France)
• Hardware modifications and back-fitting for accident management
• Long term measures - hydrogen control, containment filtered venting
→ Many RBs are or plan on conducting inspections of modifications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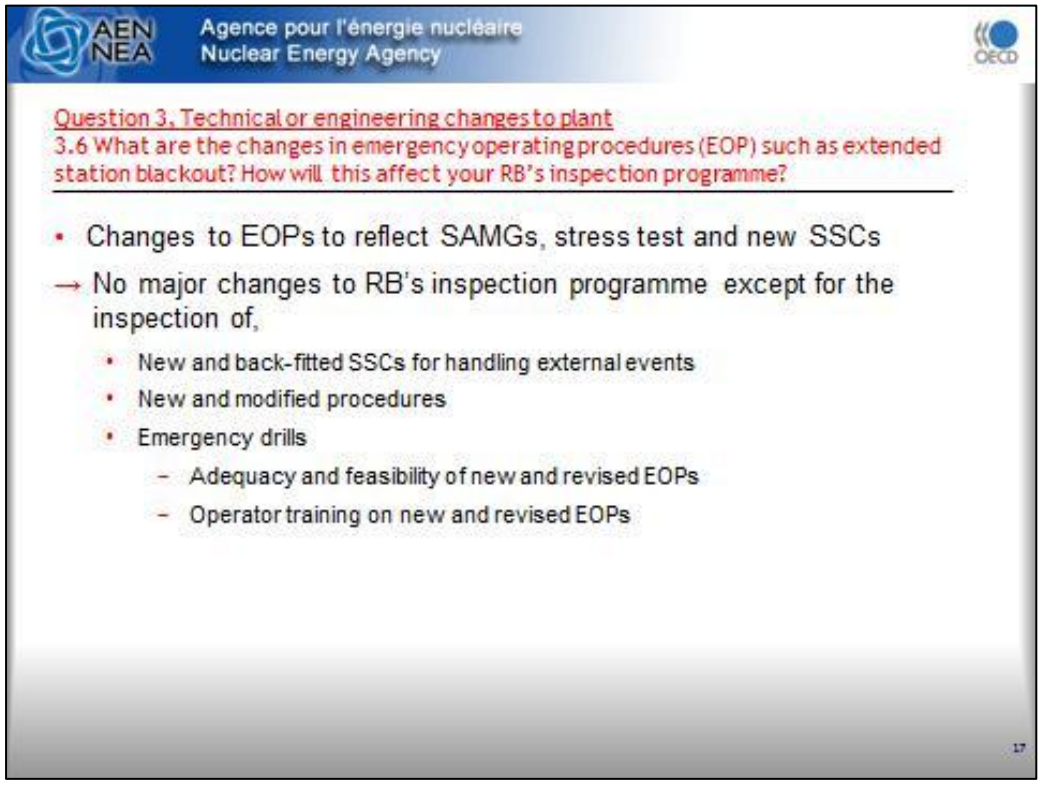
Question 3, Technical or engineering changes to plant
3.5 What are the plans of your RB to inspect/assess plant design conditions wrt external events such as flooding, cyclones, earthquakes, etc.?
Assessment of NPPs design
• WGs, committees and task forces reveiwed plant vulnerabilities
• Stress test assessed impact of external events
RBs confirm implementation of modifications and NPP readyness
• Inspections (focused, routine, baseline)
• Walkdowns (seismic, flooding)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Question 3, Technical or engineering changes to plant
3.6 What are the changes in emergency operating procedures (EOP) such as extended station blackout? How will this affect your RB's inspection programme?
• Changes to EOPs to reflect SAMGs, stress test and new SSCs
→ No major changes to RB's inspection programme except for the inspection of,
• New and back-fitted SSCs for handling external events
• New and modified procedures
• Emergency drills
– Adequacy and feasibility of new and revised EOPs
– Operator training on new and revised EOPs
17


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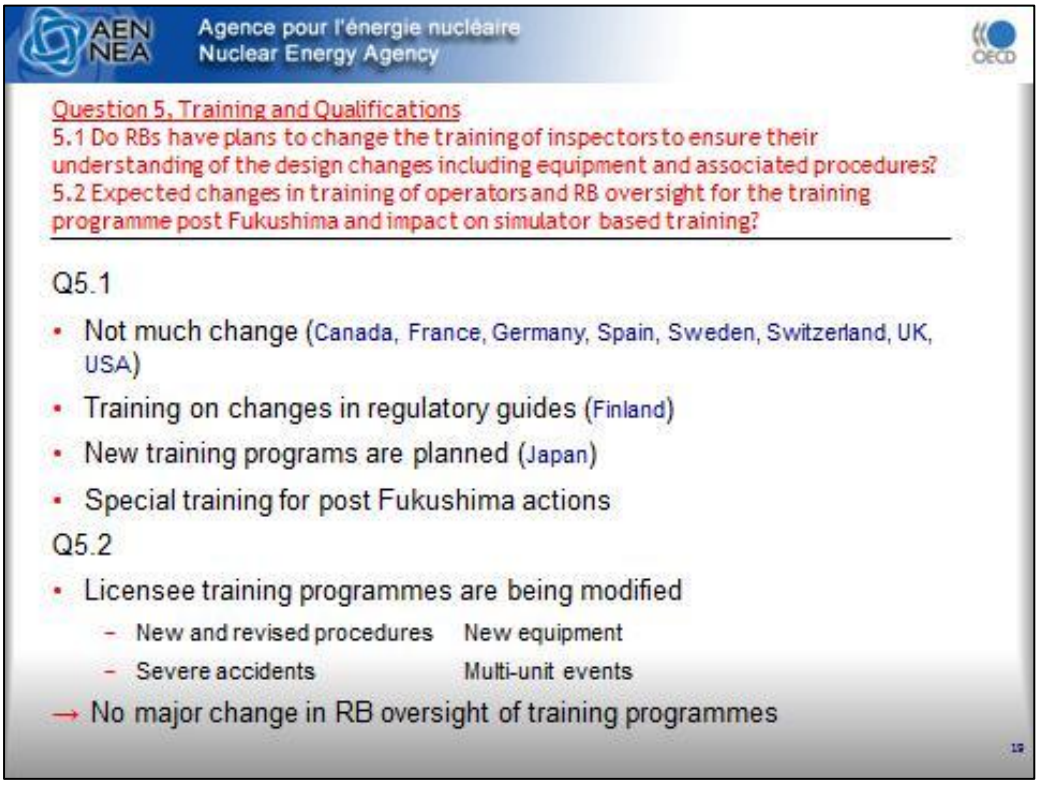
Question 4, Post Fukushima inspection programme changes
4.1 Were focused inspections conducted immediately after the event? Did they result in long term changes to your inspection programme?
4.2 Changes in frequency, scope, method of inspections conducted post Fukushima?
Q4.1
• Focused inspections immediately after Fukushima to assess NPP safety against external events (France, Germany, India, Japan, Korea, Mexico, Switzerland, USA)
→ No long-term changes in RB's inspection programme except for the inspection of post Fukushima actions
Q4.2
• Generally, no major change in inspection frequency, scope and method of inspections
– Number of inspections looking at post Fukushima modifications has increased
– Long-term changes to inspection programmes may be needed (Canada, USA)
18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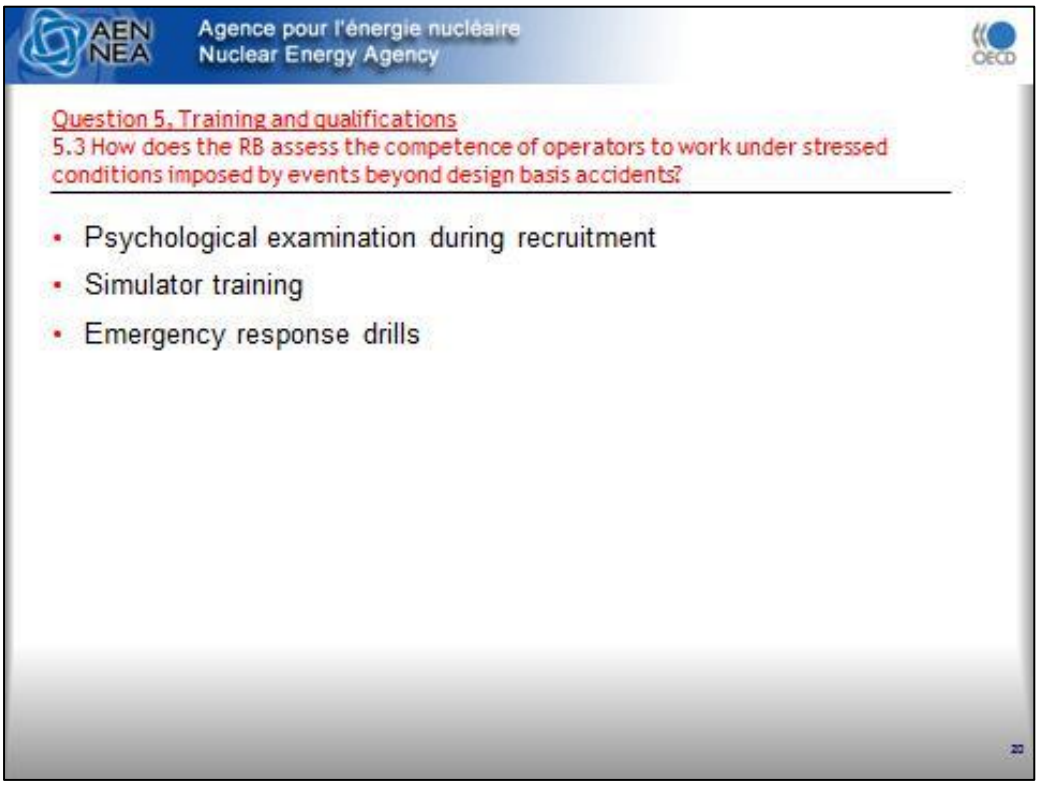
Question 5, Training and Qualifications
5.1 Do RBs have plans to change the training of inspectors to ensure their understanding of the design changes including equipment and associated procedures?
5.2 Expected changes in training of operators and RB oversight for the training programme post Fukushima and impact on simulator based training?
Q5.1
• Not much change (Canada, France, Germany, Spain, Sweden, Switzerland, UK, USA)
• Training on changes in regulatory guides (Finland)
• New training programs are planned (Japan)
• Special training for post Fukushima actions
Q5.2
• Licensee training programmes are being modified
– New and revised procedures New equipment
– Severe accidents Multi-unit events
→ No major change in RB oversight of training programmes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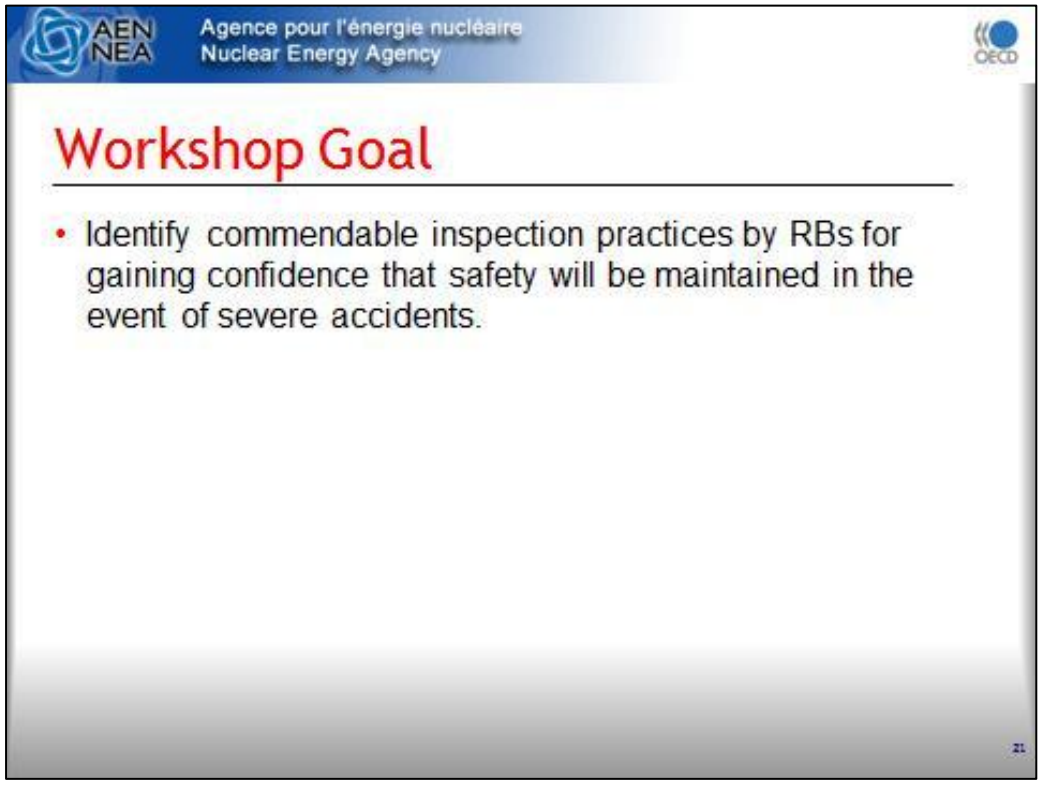
Question 5, Training and qualifications
5.3 How does the RB assess the competence of operators to work under stressed conditions imposed by events beyond design basis accidents?
• Psychological examination during recruitment
• Simulator training
• Emergency response drills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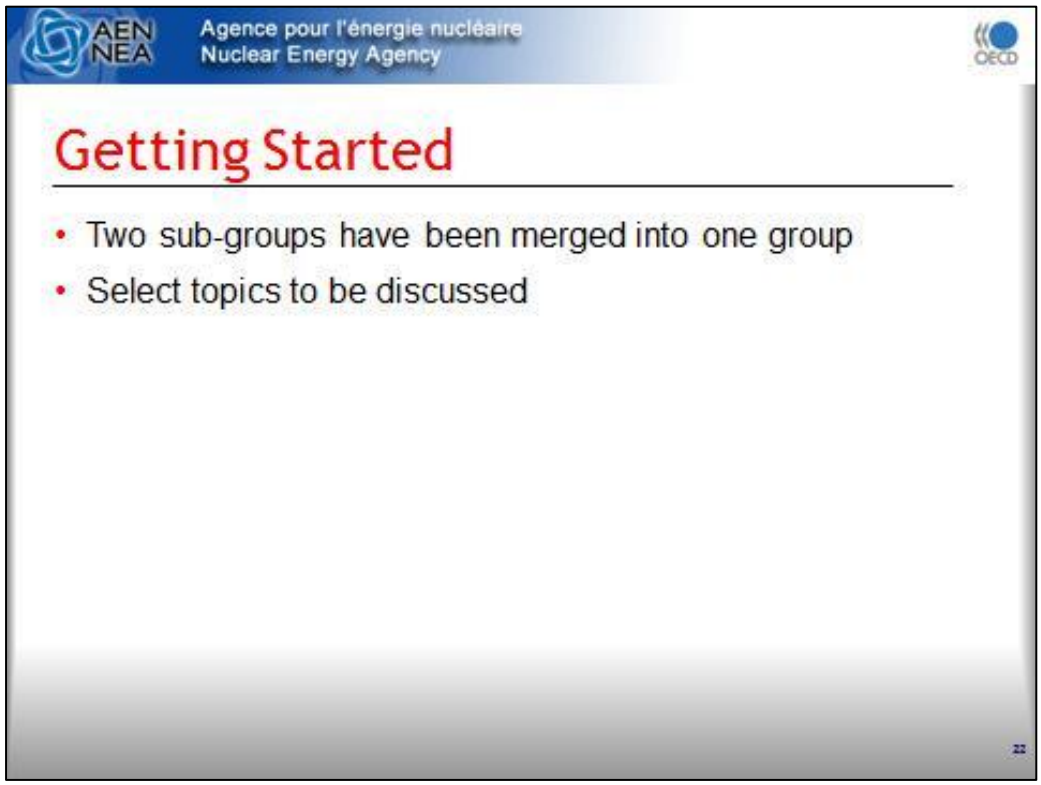
Workshop Goal
• Identify commendable inspection practices by RBs for gaining confidence that safety will be maintained in the event of severe accidents.
21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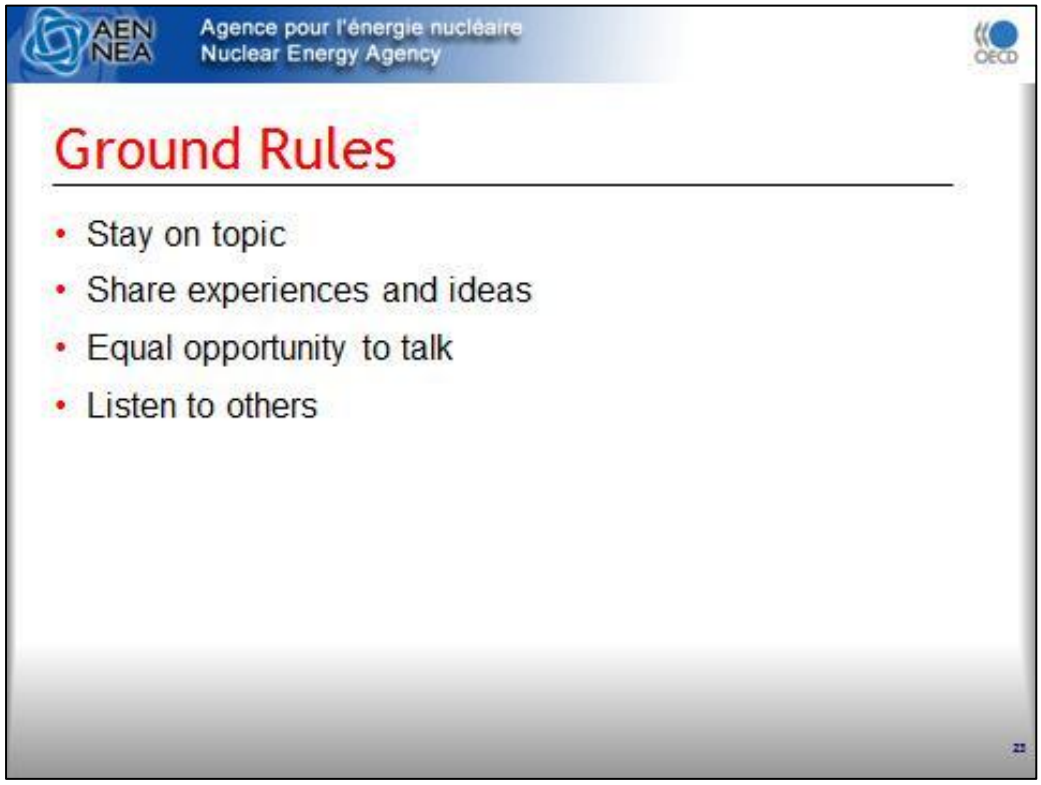
Getting Started
• Two sub-groups have been merged into one group
• Select topics to be discussed
22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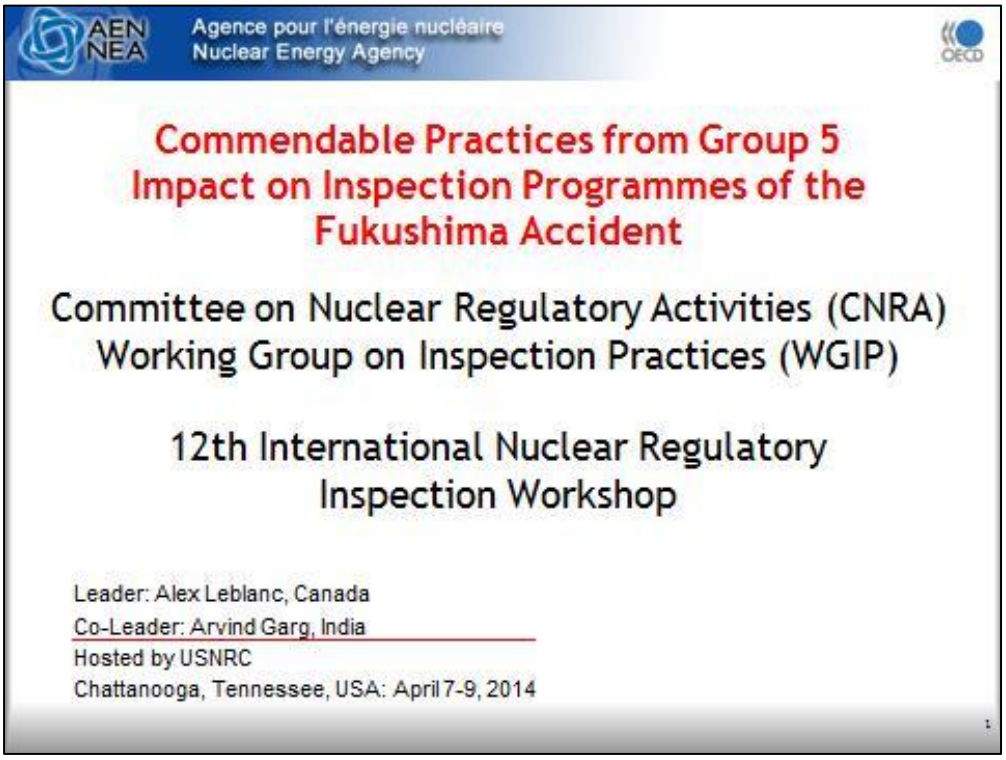
Ground Rules
• Stay on topic
• Share experiences and ideas
• Equal opportunity to talk
• Listen to others

16. TOPIC C: THE IMPACT ON INSPECTION PROGRAMMES OF THE FUKUSHIMA DAIICHI NPP ACCIDENT - CLOSING PRESENTATION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Commendable Practices from Group 5
Impact on Inspection Programmes of the
Fukushima Accident
Committee on Nuclear Regulatory Activities (CNRA)
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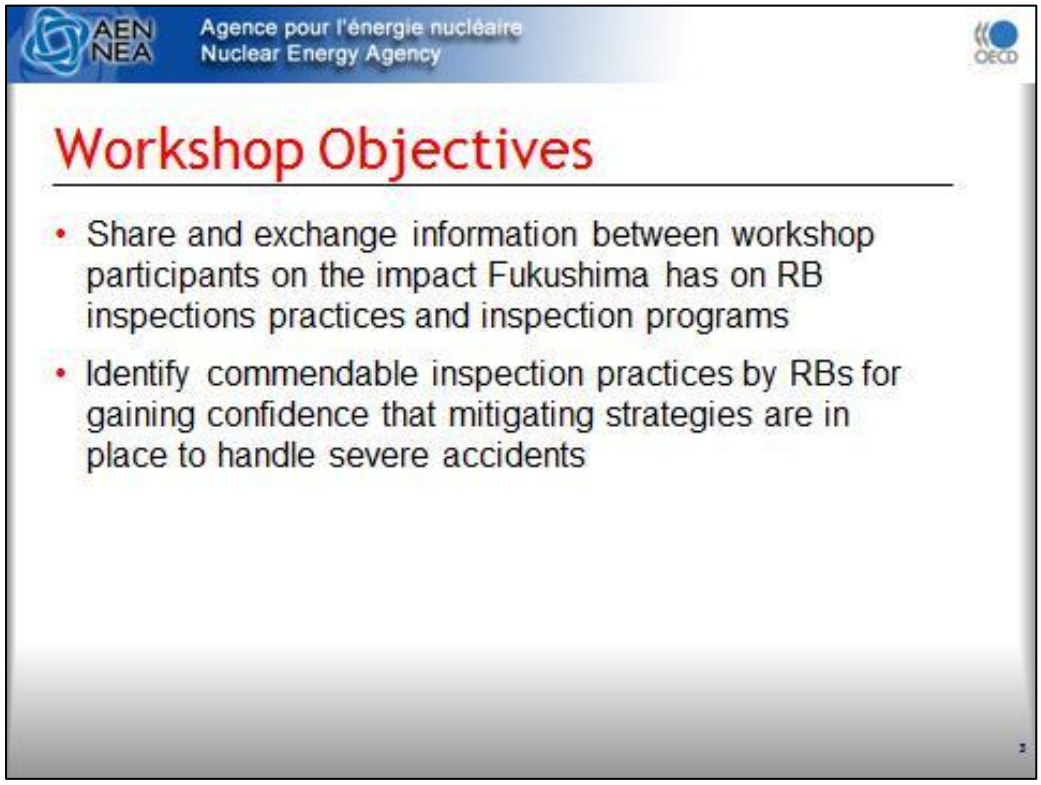
Workshop Discussion Group
Steve Campbell USA
Arvind-Paul Garg India
Per-Olof Hagg Sweden
Sergey Khlabystov Russia
Tim Kobetz IAEA
Alex Leblanc Canada
Michel Lemay Canada
Michal Melicharek Slovak Republic
Gregory Roach USA
Patric Scheib Germany
Peter St. Michael Canada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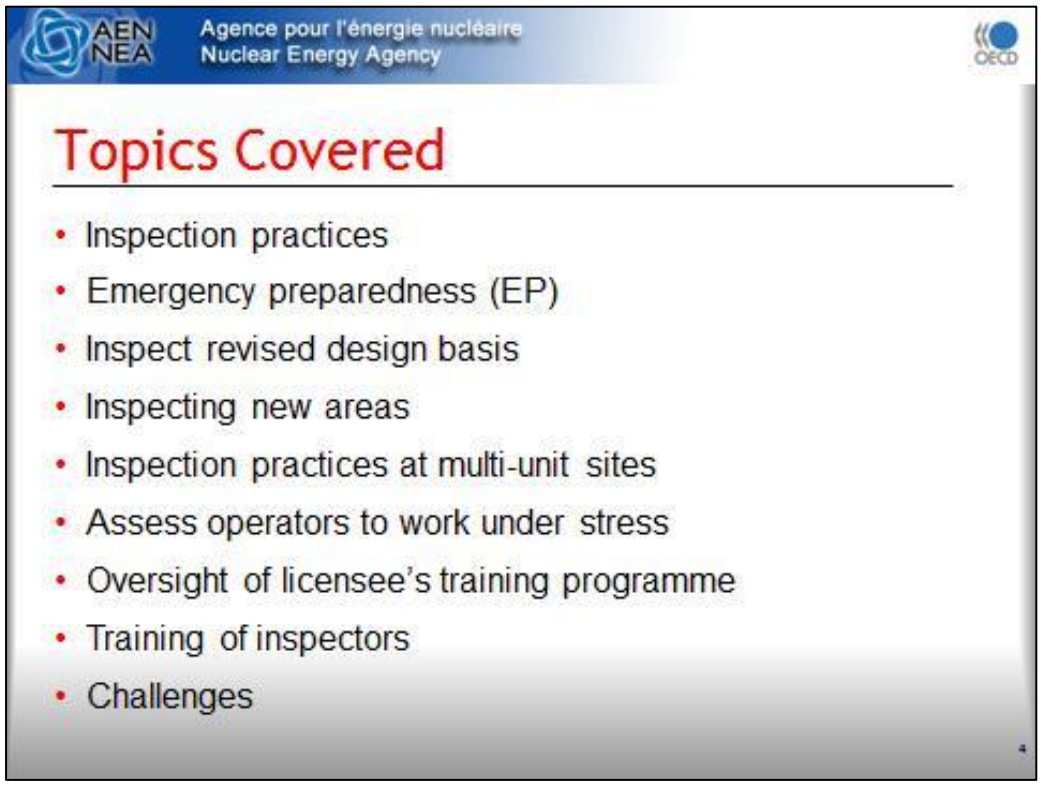
Workshop Objectives
• Share and exchange information between workshop participants on the impact Fukushima has on RB inspections practices and inspection programs
• Identify commendable inspection practices by RBs for gaining confidence that mitigating strategies are in place to handle severe accidents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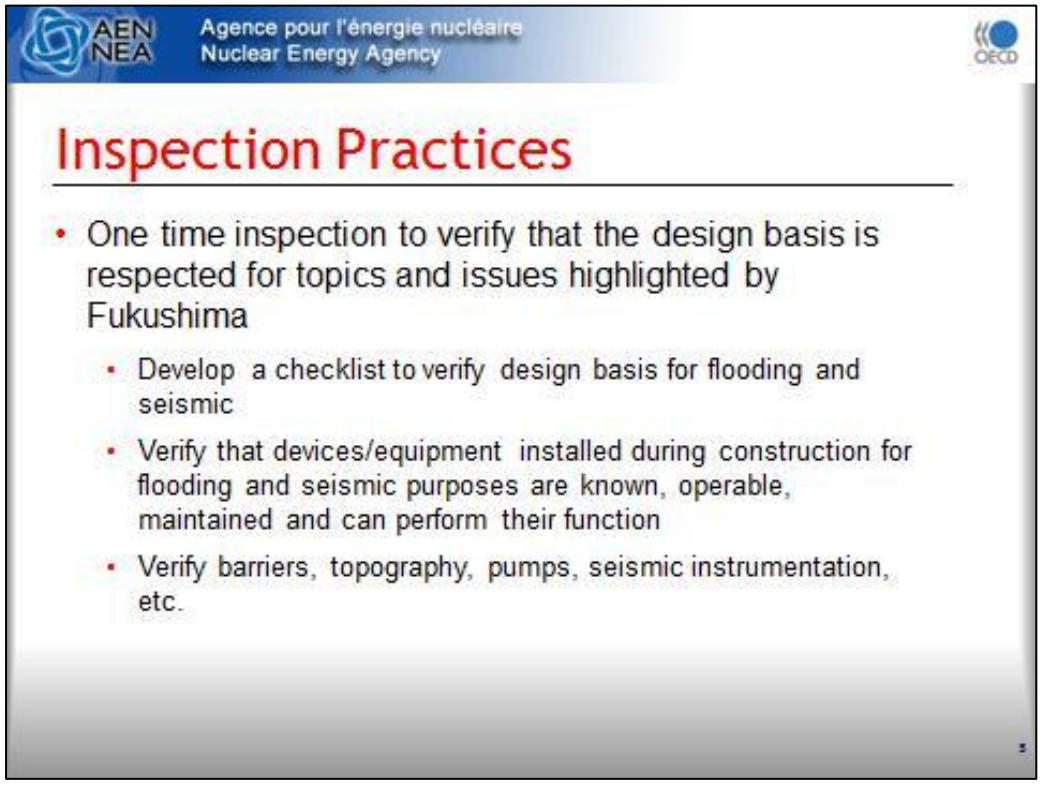
Topics Covered
• Inspection practices
• Emergency preparedness (EP)
• Inspect revised design basis
• Inspecting new areas
• Inspection practices at multi-unit sites
• Assess operators to work under stress
• Oversight of licensee's training programme
• Training of inspectors
• Challenges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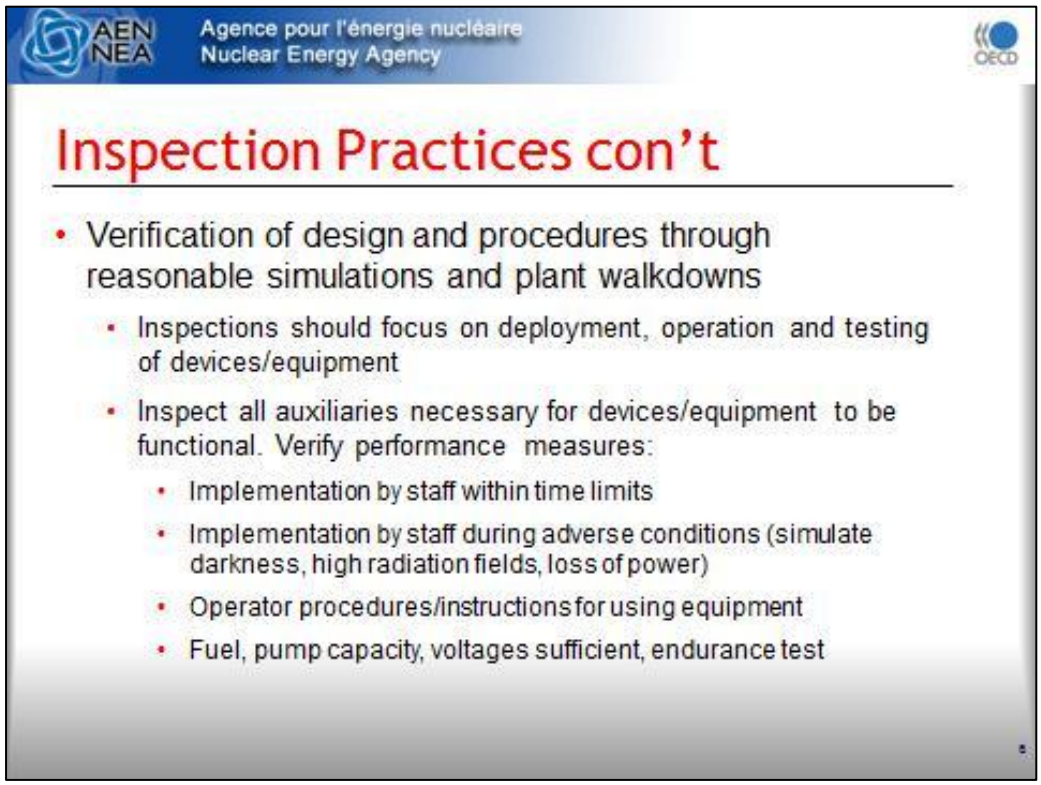
Inspection Practices
• One time inspection to verify that the design basis is respected for topics and issues highlighted by Fukushima
• Develop a checklist to verify design basis for flooding and seismic
• Verify that devices/equipment installed during construction for flooding and seismic purposes are known, operable, maintained and can perform their function
• Verify barriers, topography, pumps, seismic instrumentation, etc.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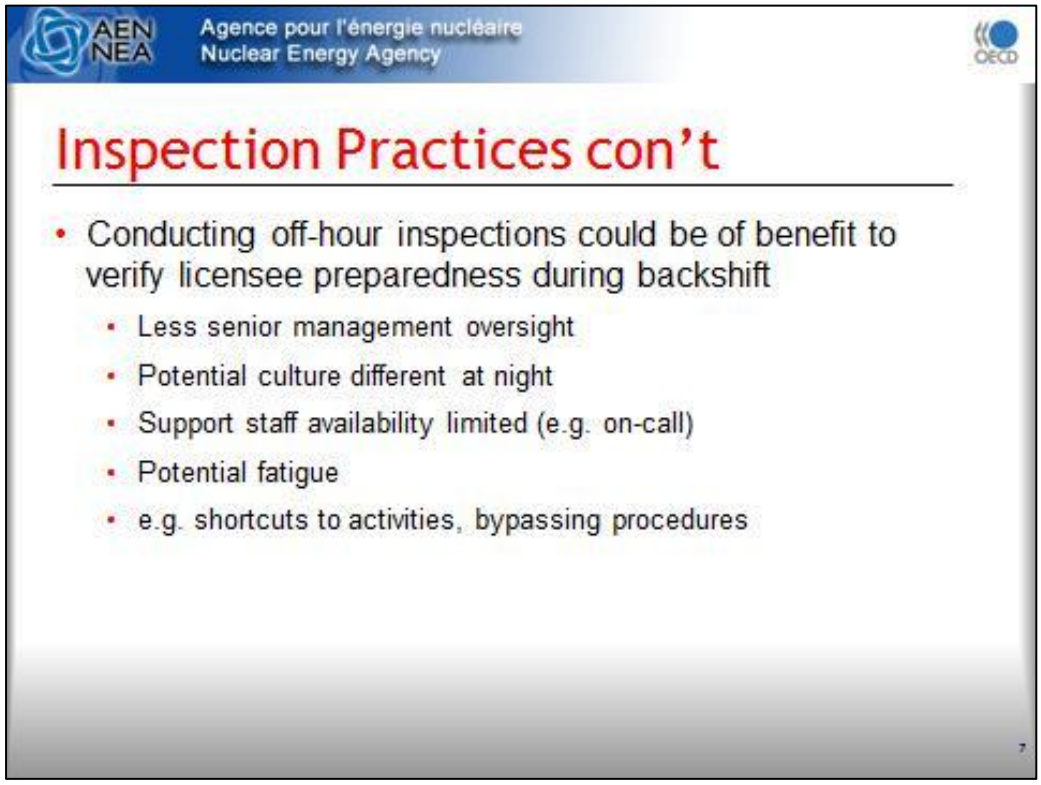
Inspection Practices con't
• Verification of design and procedures through reasonable simulations and plant walkdowns
• Inspections should focus on deployment, operation and testing of devices/equipment
• Inspect all auxiliaries necessary for devices/equipment to be functional. Verify performance measures:
• Implementation by staff within time limits
• Implementation by staff during adverse conditions (simulate darkness, high radiation fields, loss of power)
• Operator procedures/instructions for using equipment
• Fuel, pump capacity, voltages sufficient, endurance test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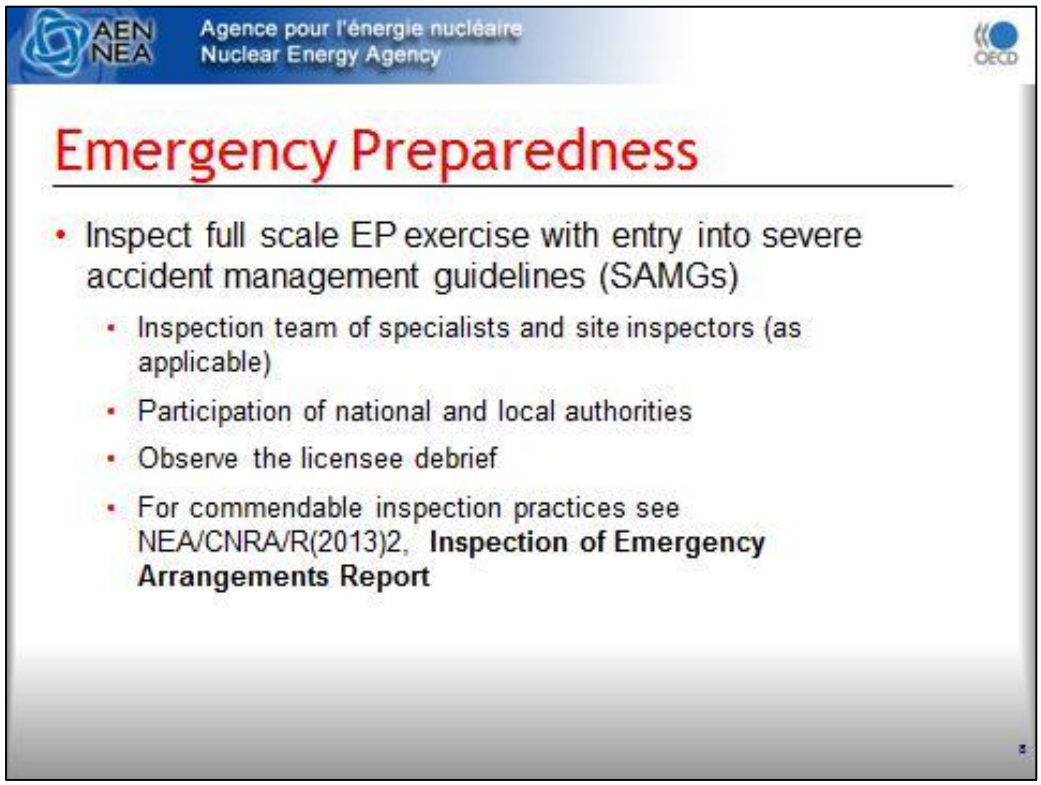
Inspection Practices con't
• Conducting off-hour inspections could be of benefit to verify licensee preparedness during backshift
• Less senior management oversight
• Potential culture different at night
• Support staff availability limited (e.g. on-call)
• Potential fatigue
• e.g. shortcuts to activities, bypassing procedures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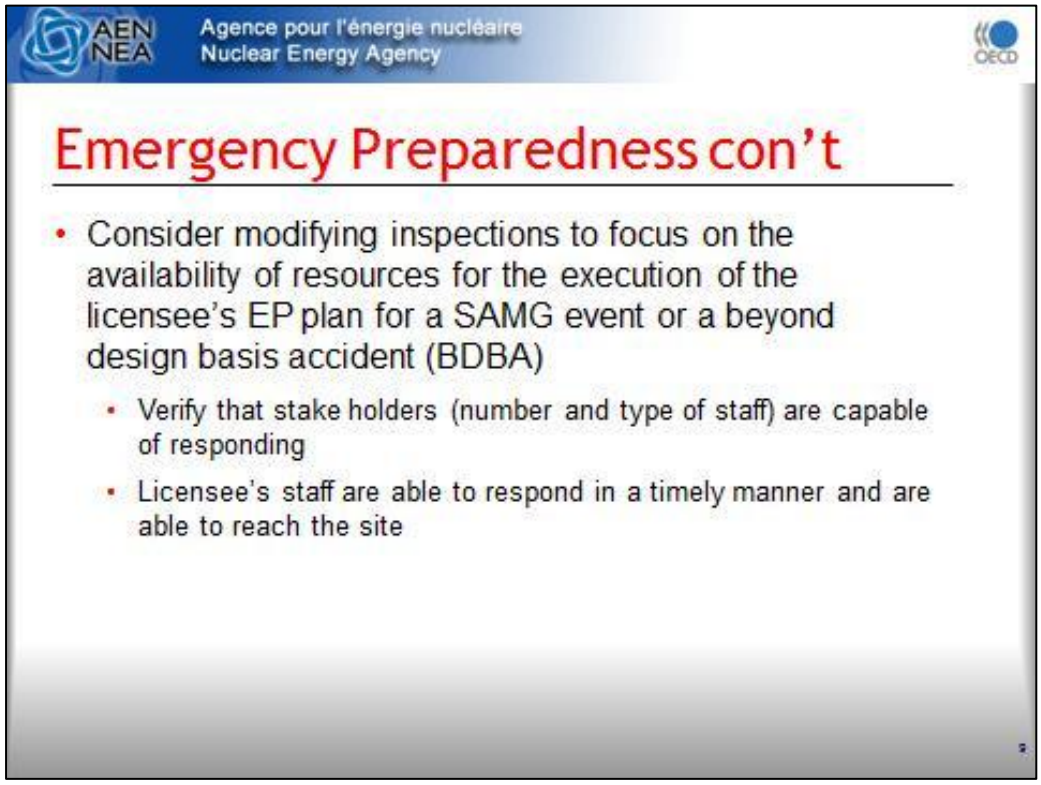
Emergency Preparedness
• Inspect full scale EP exercise with entry into severe accident management guidelines (SAMGs)
• Inspection team of specialists and site inspectors (as applicable)
• Participation of national and local authorities
• Observe the licensee debrief
• For commendable inspection practices see NEA/CNRA/R(2013)2, Inspection of Emergency Arrangements Report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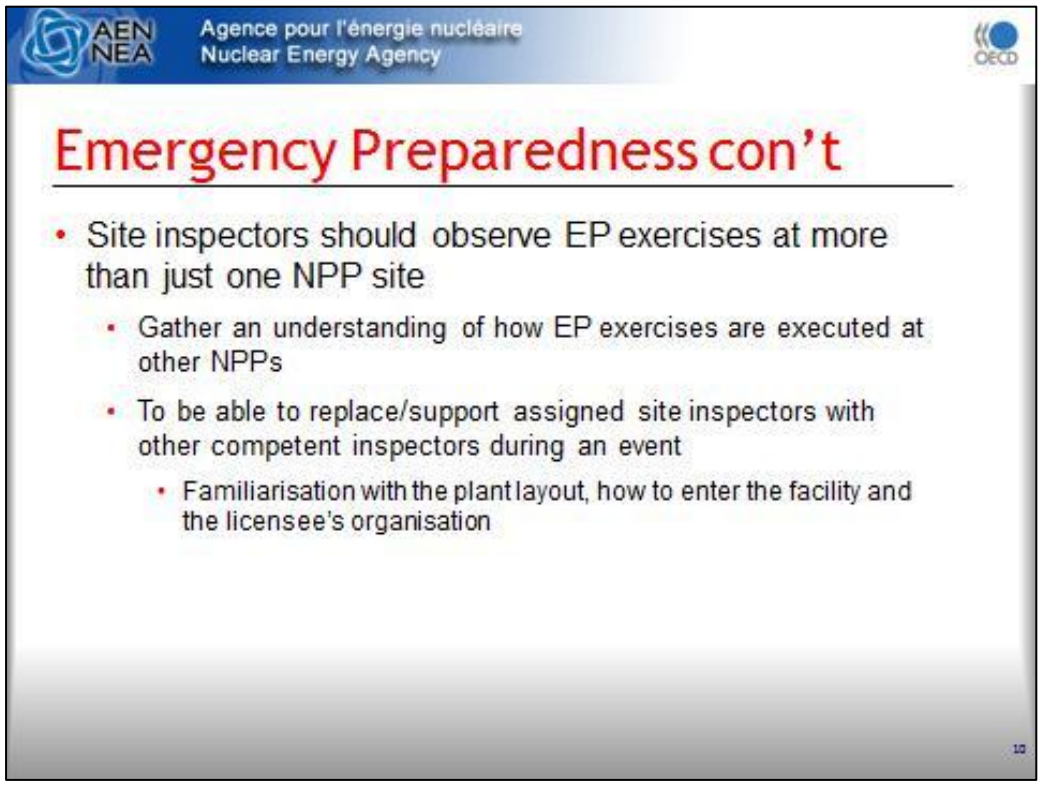
Emergency Preparedness con't
• Consider modifying inspections to focus on the availability of resources for the execution of the licensee's EP plan for a SAMG event or a beyond design basis accident (BDBA)
• Verify that stake holders (number and type of staff) are capable of responding
• Licensee's staff are able to respond in a timely manner and are able to reach the site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Emergency Preparedness con't
• Site inspectors should observe EP exercises at more than just one NPP site
• Gather an understanding of how EP exercises are executed at other NPPs
• To be able to replace/support assigned site inspectors with other competent inspectors during an event
• Familiarisation with the plant layout, how to enter the facility and the licensee's organisation


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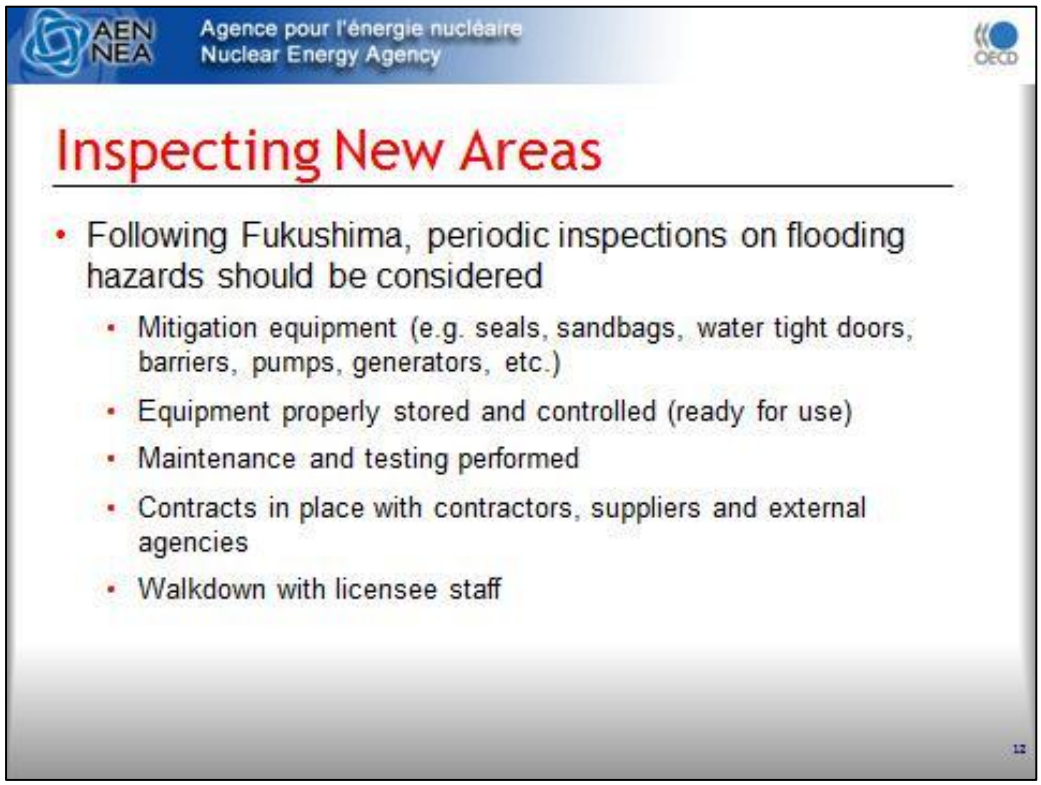
Inspect Revised Design Basis
• If, post Fukushima, there is a revised design basis, carry out inspections to verify that vulnerabilities of systems, structures and components (SSC) were addressed by the licensee
▪ Technical staff verifies new design and compiles checklists for inspectors
▪ RB may opt to use licensee's checklist
▪ Inspection team comprised of specialists and site inspectors (as applicable)
11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Inspecting New Areas
• Following Fukushima, periodic inspections on flooding hazards should be considered
▪ Mitigation equipment (e.g. seals, sandbags, water tight doors, barriers, pumps, generators, etc.)
▪ Equipment properly stored and controlled (ready for use)
▪ Maintenance and testing performed
▪ Contracts in place with contractors, suppliers and external agencies
▪ Walkdown with licensee staff
12


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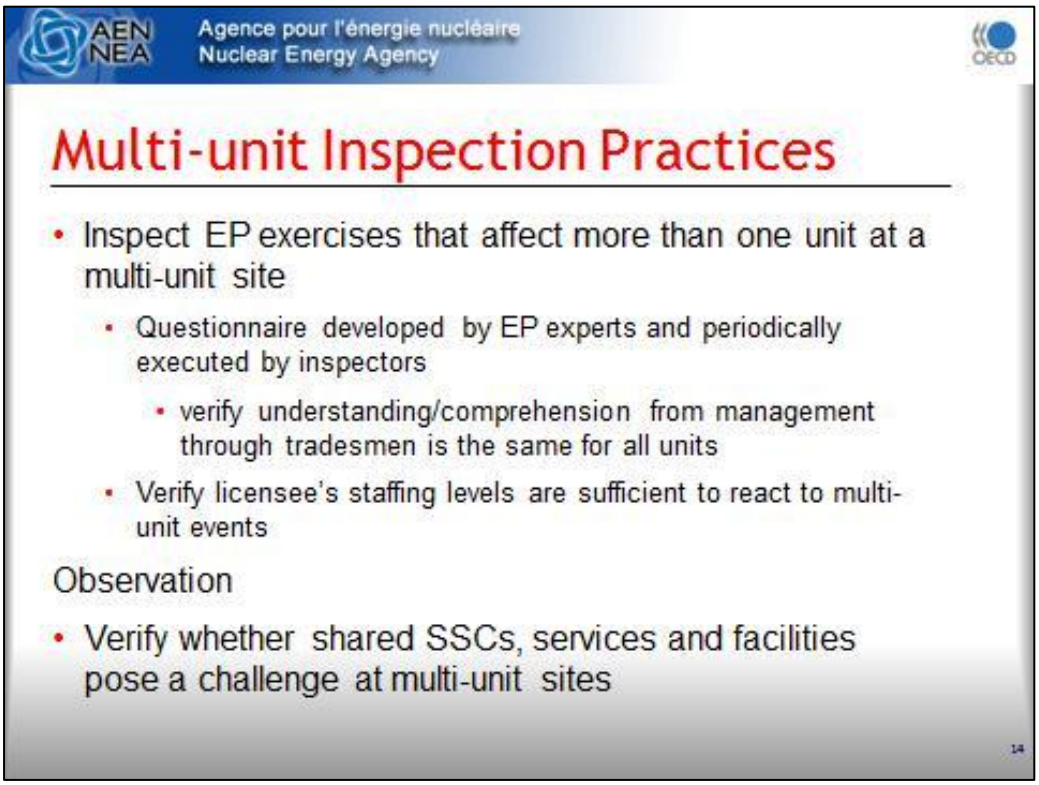
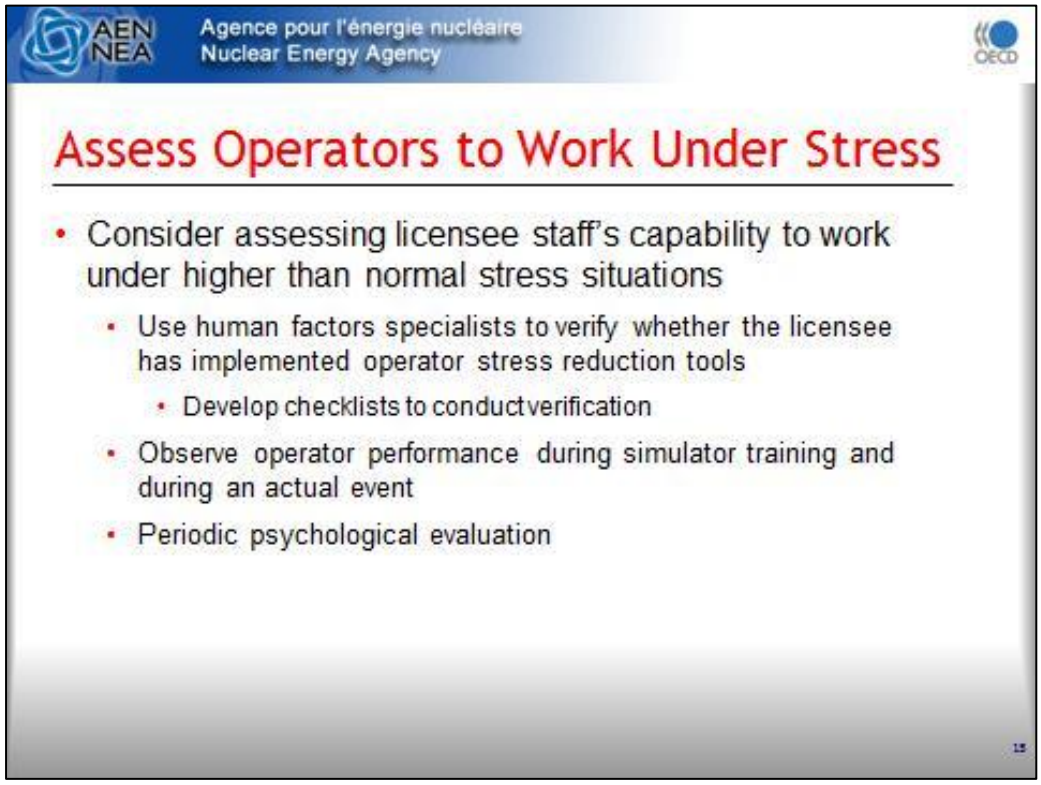
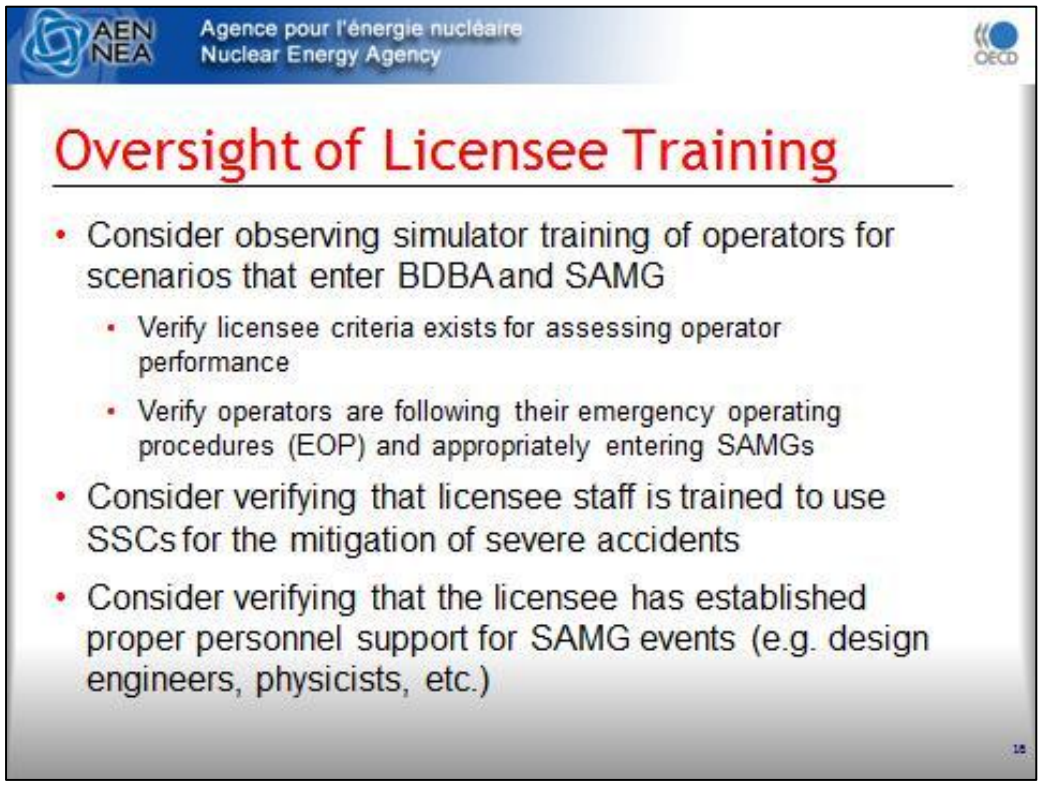
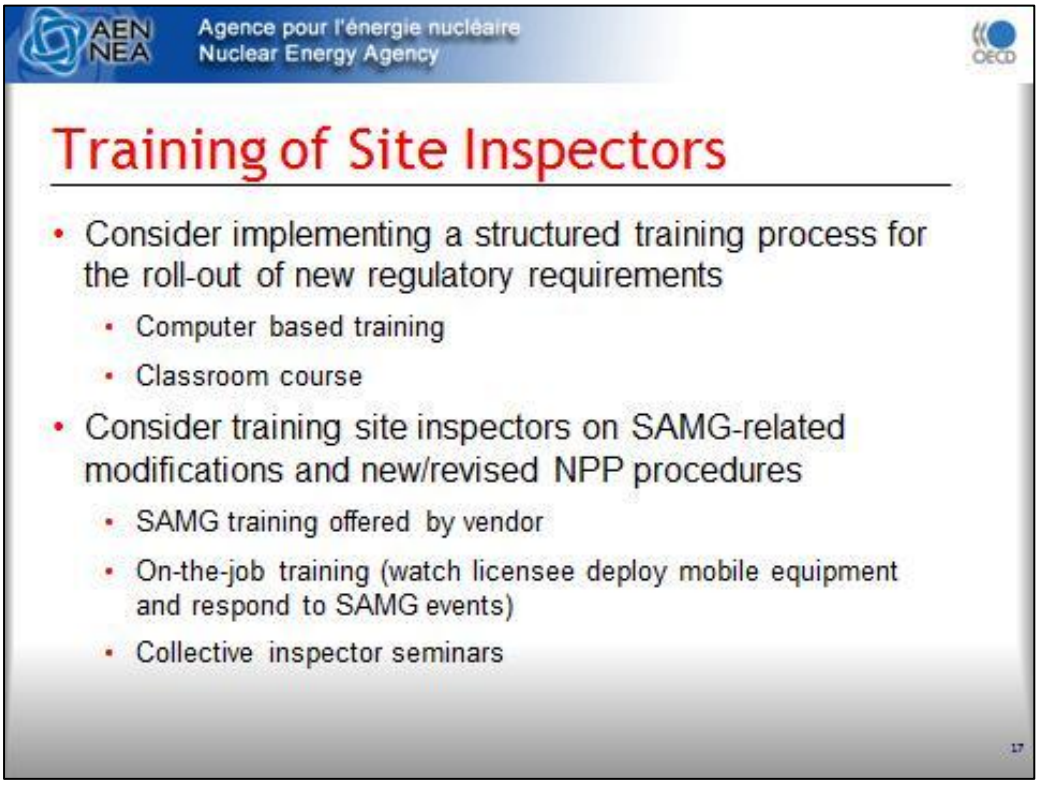
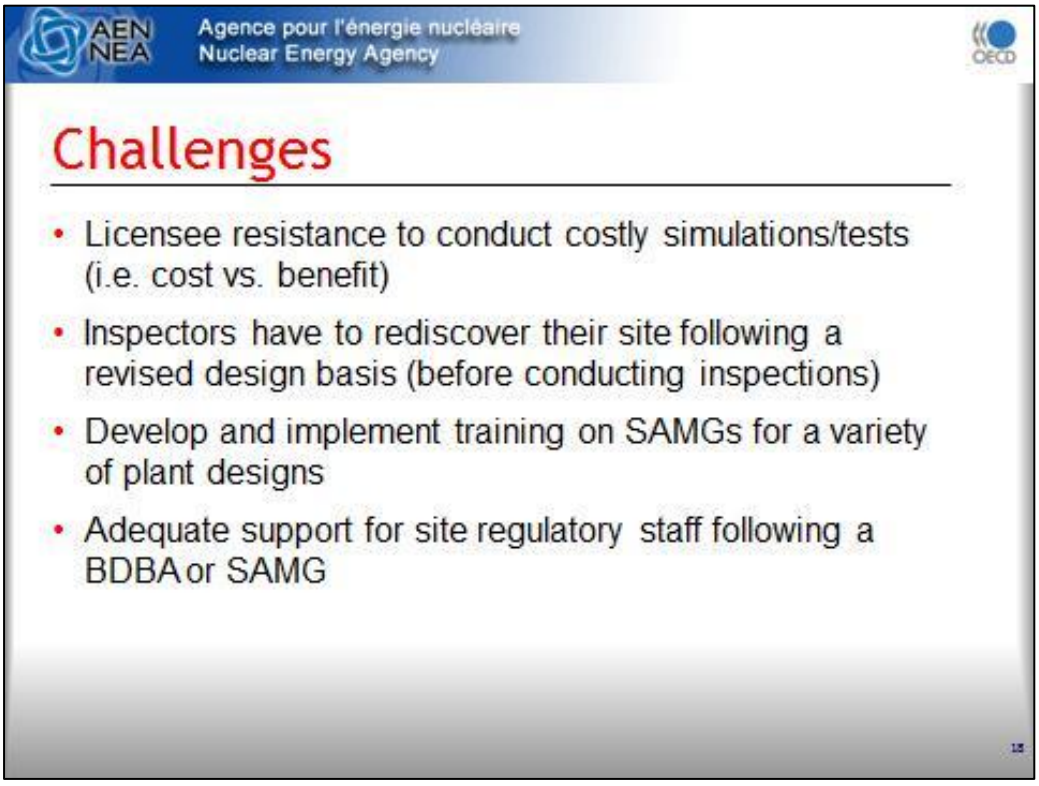
Inspecting New Areas con't
• Following Fukushima, periodic inspections on seismic hazards should be considered
▪ Existing structures that impact equipment (e.g. cinder block walls reinforced, fire sprinkler heads)
▪ Equipment secured (e.g. compressed gas cylinders, equipment that can topple over or roll, overhead crane brakes engaged, scaffolding secured)
▪ Seismic instrumentation available and maintained
▪ Anchor blots properly installed
▪ Verify that licensees have tested and inspected seismic piping supports
13

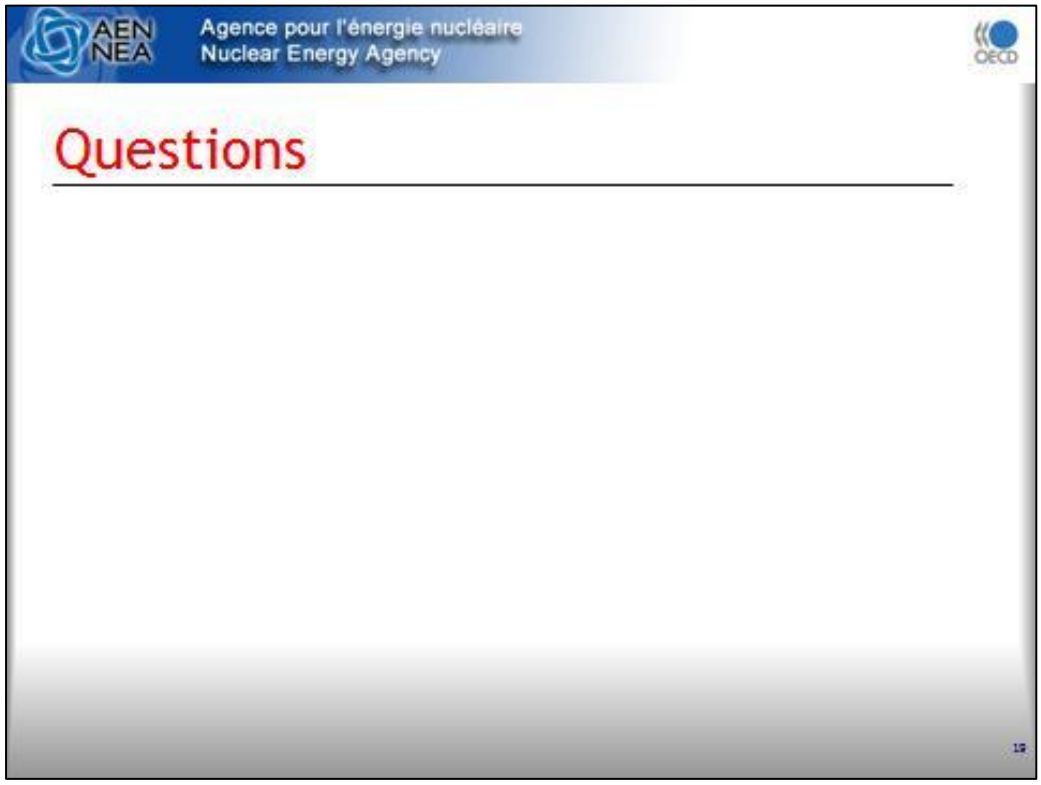

Agence pour l'énergie nucléaire
Nuclear Energy Agency
Multi-unit Inspection Practices
• Inspect EP exercises that affect more than one unit at a multi-unit site
▪ Questionnaire developed by EP experts and periodically executed by inspectors
▪ verify understanding/comprehension from management through tradesmen is the same for all units
▪ Verify licensee's staffing levels are sufficient to react to multi-unit events
Observation
• Verify whether shared SSCs, services and facilities pose a challenge at multi-unit sites
14


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Assess Operators to Work Under Stress
• Consider assessing licensee staff's capability to work under higher than normal stress situations
• Use human factors specialists to verify whether the licensee has implemented operator stress reduction tools
• Develop checklists to conduct verification
• Observe operator performance during simulator training and during an actual event
• Periodic psychological evaluation


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Oversight of Licensee Training
• Consider observing simulator training of operators for scenarios that enter BDBA and SAMG
• Verify licensee criteria exists for assessing operator performance
• Verify operators are following their emergency operating procedures (EOP) and appropriately entering SAMGs
• Consider verifying that licensee staff is trained to use SSCs for the mitigation of severe accidents
• Consider verifying that the licensee has established proper personnel support for SAMG events (e.g. design engineers, physicists, etc.)


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Training of Site Inspectors
• Consider implementing a structured training process for the roll-out of new regulatory requirements
• Computer based training
• Classroom course
• Consider training site inspectors on SAMG-related modifications and new/revised NPP procedures
• SAMG training offered by vendor
• On-the-job training (watch licensee deploy mobile equipment and respond to SAMG events)
• Collective inspector seminars


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Challenges
• Licensee resistance to conduct costly simulations/tests (i.e. cost vs. benefit)
• Inspectors have to rediscover their site following a revised design basis (before conducting inspections)
• Develop and implement training on SAMGs for a variety of plant designs
• Adequate support for site regulatory staff following a BDBA or SAMG


Agence pour l'énergie nucléaire
Nuclear Energy Agency
Questions

17. HOST COUNTRY PRESENTATIONS-

17.1. INSIGHTS INTO THE USE OF RISK IN REGULATORY OVERSIGHT


U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment
Insights into the Use of Risk in Regulatory Oversight
International Nuclear Regulatory Inspection Workshop
April 9, 2014
John David Hanna
Senior Reactor Analyst
US Nuclear Regulatory Commission, Region II Office
001-404-997-4552 John.Hanna@nrc.gov


U.S.NRC
Protecting People and the Environment
Some Processes Where Risk is Used:
• Notices of Enforcement Discretion
• Event Assessments
• Licensing Decisions
• Selection of Inspection Samples
• Significance Determination Process
2

Significance Determ. (Background Inform.)

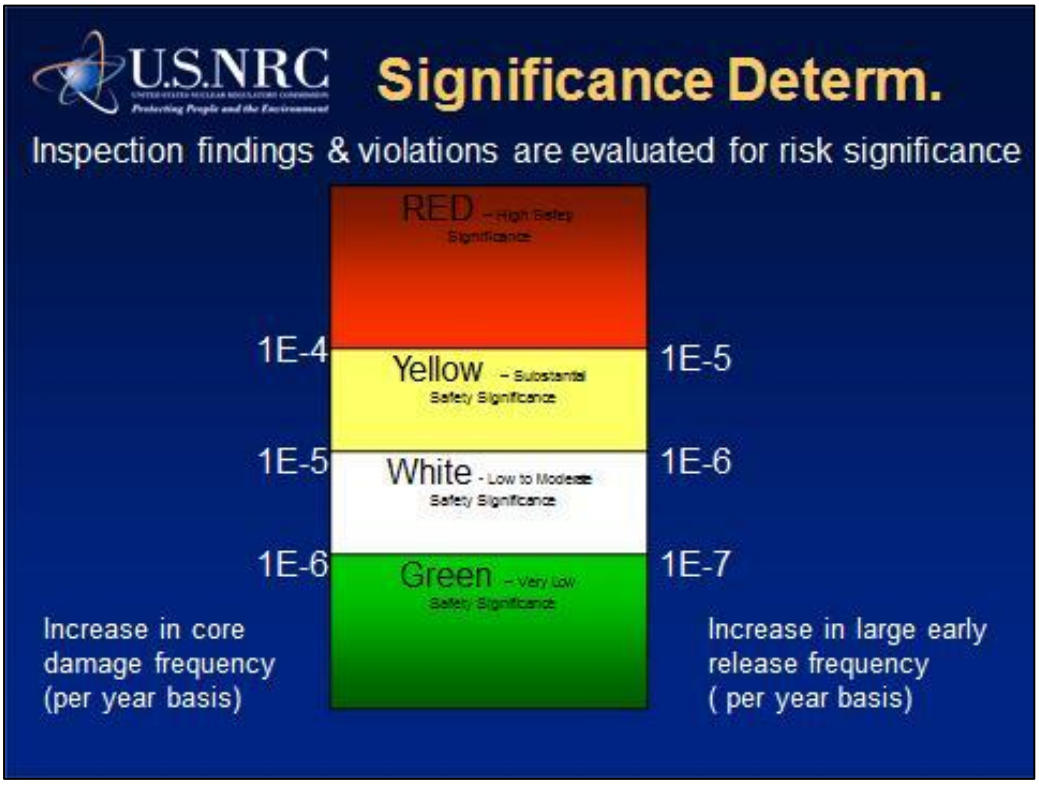
- Old regulatory assessment process
- "Risk informed" versus "risk based"
- "Resolution" of our decisions has changed significantly

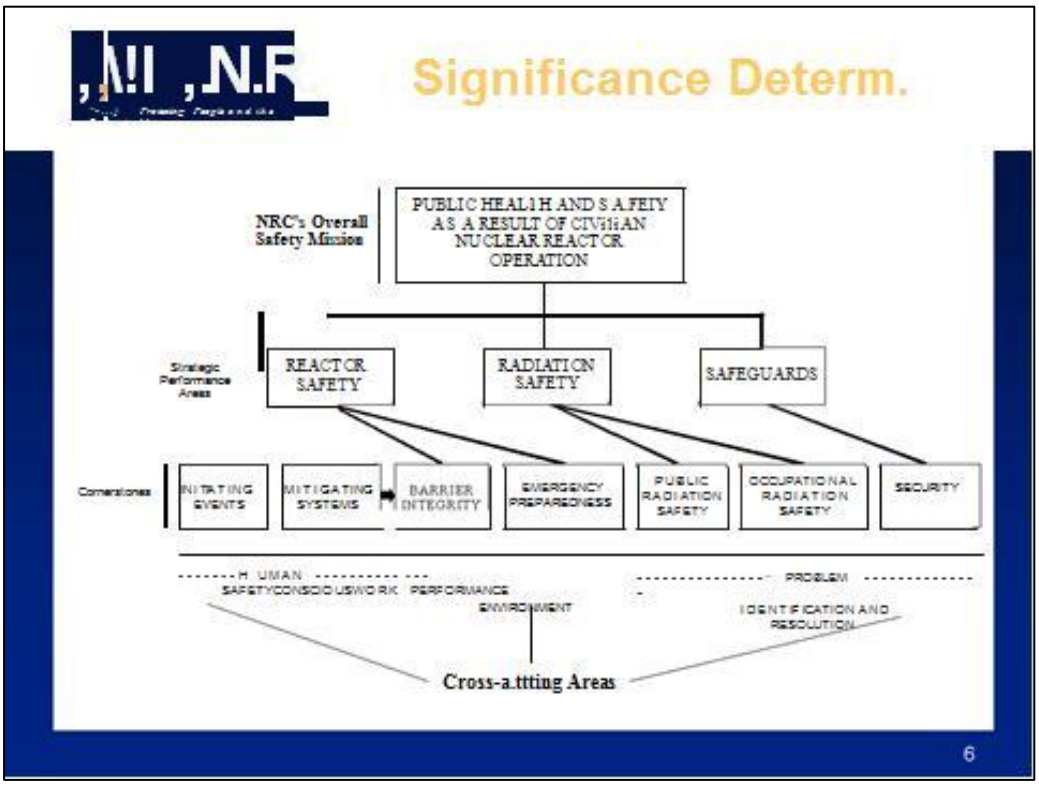
3

Significance Determ. (The Process Described)

- Inspectors identify a finding or violation
- Initial screening of the finding
- Issue is sent to Senior Reactor Analyst
- Formal risk assessment is performed
- Headquarters concurs on decision
- Letter is sent to licensee informing them
- Public regulatory conference with licensee
- Final decision is made
- Licensee can appeal the decision, … if desired.

4


U.S.NRC
Significance Determ.
Inspection findings & violations are evaluated for risk significance
RED – High Safety Significance
1E-4
1E-5
Yellow – Substantial Safety Significance
1E-5
1E-6
White - Low to Moderate Safety Significance
1E-6
1E-7
Green – Very Low Safety Significance
Increase in core damage frequency (per year basis)
Increase in large early release frequency (per year basis)


Significance Determ.
NRC's Overall Safety Mission
PUBLIC HEALTH AND SAFETY AS A RESULT OF CIVILIAN NUCLEAR REACTOR OPERATION
Strategic Performance Areas
REACTOR SAFETY
RADIATION SAFETY
SAFEGUARDS
Cornerstones
INITIATING EVENTS
MITIGATING SYSTEMS
BARRIER INTEGRITY
EMERGENCY PREPAREDNESS
PUBLIC RADIATION SAFETY
OCCUPATIONAL RADIATION SAFETY
SECURITY
HUMAN PERFORMANCE
SAFETY CONSCIOUS WORK ENVIRONMENT
PROBLEM IDENTIFICATION AND RESOLUTION
Cross-cutting Areas
6

Significance Determ. (Challenges)

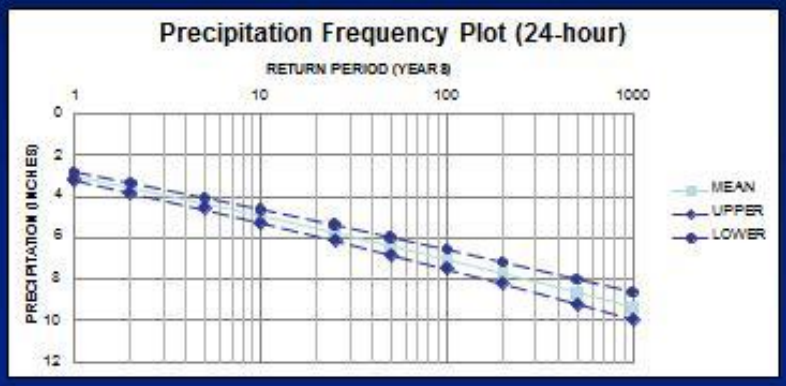
- Generic vs. Plant Specific data
- Little standardization of design/operation

- Uncertainty
- Using results which are "good enough"

7

Significance Determ. (Challenges Continued)

- "Rare" External Events
  - Frequency determination



8

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United States Nuclear Regulatory Commission
Protecting People and the Environment

Significance Determ. (Challenges Continued)

- Locations of These Events or Conditions

9

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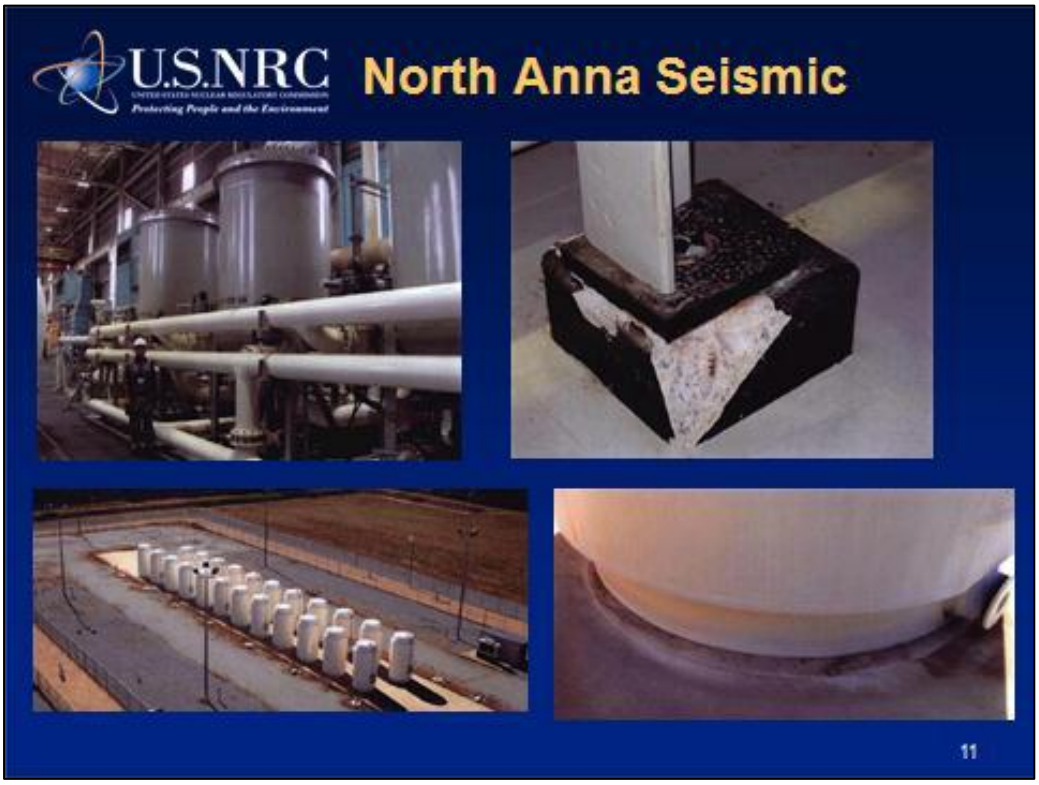
United States Nuclear Regulatory Commission
Protecting People and the Environment

Browns Ferry Tornado

- April 27, 2011: severe weather systems moved through local area spanning high winds/tornadoes
- Grid-instability and loss of power leading to scram
- One Emergency Diesel Generator out of service during event, seven others available
- Extensive damage to the area grid

10


U.S.NRC
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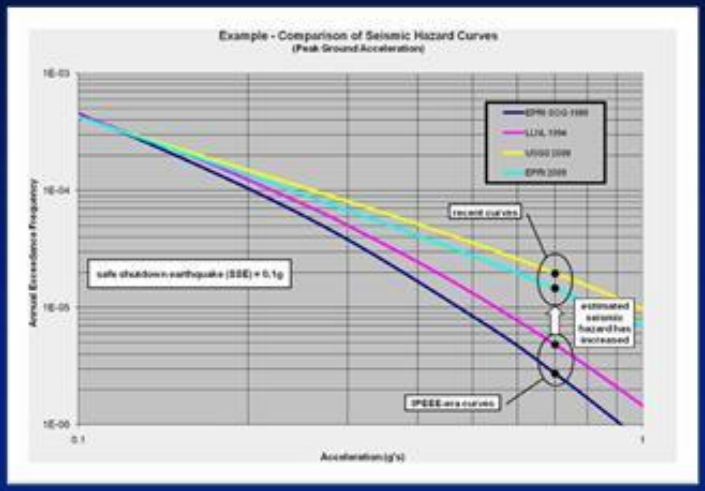
North Anna Seismic
11


U.S.NRC
Protecting People and the Environment
Fort Calhoun Flooding
12

U.S.NRC
Protecting People and the Environment

Significance Determ. (Challenges Continued)

Causes of Recent Challenges via External Hazards?



13

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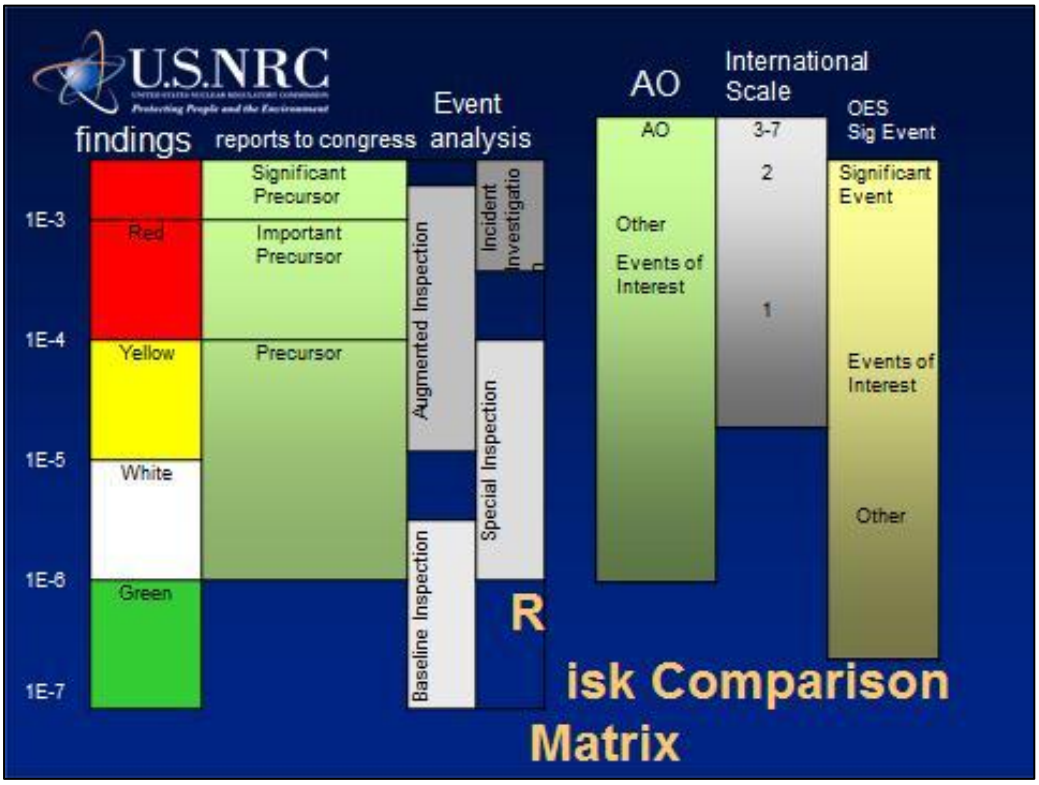
Internal Events vs. External

- Intersystem loss of coolant accidents
- Loss of coolant accidents (small, medium, large)
- Loss of electrical power (AC or DC)
- Loss of heat sink
- Reactor trip
- Loss of main feedwater
- Loss of instrument air supply
- Steam generator tube rupture
- Loss of service water cooling

14


U.S.NRC
Protecting People and the Environment
findings
reports to congress
Event analysis
AO
International Scale
OES
Sig Event
1E-3
1E-4
1E-5
1E-6
1E-7
Red
Yellow
White
Green
Significant Precursor
Important Precursor
Precursor
Augmented Inspection
Incident Investigation
Special Inspection
Baseline Inspection
AO
Other
Events of Interest
3-7
2
1
Significant Event
Events of Interest
Other
Risk Comparison Matrix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Significance Determ. (Challenges Continued)
• "Ground rules" by which we measure risk
• Event assessment vs. condition assess.
• Communication internally and externally (NRC management & stakeholders)
16


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Risk Informed Significance Determination Process (Advantages)
• Flexibility
• Focuses the discussion on what is truly important to public safety
• Improves use of limited resources
• Objectivity
17


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Fire Risk
• Compliance with fire regulations (compliance method vs. risk based)
• How do we measure fire risk?
• Continuous risk monitoring
• Data on fire events and fire findings
• Fire risk during shutdown
18

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Fire & Shutdown Risk

Table A-3: Generic Fire Ignition Frequency Model for U.S. Nuclear Power Plants.

Bin #	Location	Ignition Source	# of Events	Total Reactor Years	Frequency (R-DAT Results)			
					Mean	5th	50th	95th
2	Containment (PWR)	Reactor Coolant Pump	3.5	519.9[2]	6.6E-03	2.6E-04	3.3E-03	1.8E-02
3P	Containment (PWR)	Transients and Hotwork	16.5	519.9	3.1E-02	-03	2.1E-02	8.2E-02
3B	Containment (BWR)	Transients and Hotwork	15.5	298.5[2]	3.5E-02	-04	7.3E-03	1.2E-01
5	Control Auxiliary/Reactor Building	Cable fires caused by welding and cutting	0.25	822.5[3]	1.2E-03	2.3E-05	3.8E-04	3.5E-03
6	Control Auxiliary/Reactor Building	Transient fires caused by welding and cutting	7	822.5	9.3E-03	3.6E-04	5.0E-03	2.5E-02
7	Control Auxiliary/Reactor Building	Transients	3.5	822.5	4.7E-03	2.0E-04	2.5E-03	1.3E-02
11	Plant-Wide Components	Cable fires caused by welding and cutting	0.25	822.5	8.8E-04	1.8E-05	2.9E-04	2.8E-03
20	Plant-Wide Components	Off-gas/Hydrogen recombiner (BWR)	3	298.5	2.0E-02	-05	3.1E-03	3.8E-02
22	Plant-Wide Components	RPS MG sets	3.25	822.5	3.2E-03	1.5E-04	1.7E-03	9.0E-03
24	Plant-Wide Components	Transient fires caused by welding and cutting	8	822.5	1.1E-02	-04	5.8E-03	3.0E-02
25	Plant-Wide Components	Transients	3.75	822.5	5.8E-03	2.1E-04	2.9E-03	1.5E-02
27	Transformer Yard	Transformer - catastrophic	5	822.5	7.2E-03	8.9E-05	2.3E-03	2.1E-02
28	Transformer Yard	Transformer - noncatastrophic	3	822.5	3.8E-03	1.6E-04	1.9E-03	1.1E-02
29	Transformer Yard	Yard Transformers (others)	1	822.5	2.0E-03	2.7E-05	6.1E-04	5.7E-03
31	Turbine Building	Cable fires caused by welding and cutting	0	822.5	1.3E-03	2.2E-05	4.0E-04	3.7E-03
32	Turbine Building	Main feedwater pumps	1.25	822.5	1.9E-03	7.6E-05	8.9E-04	5.6E-03
34	Turbine Building	T/G hydrogen	2	822.5	3.0E-03	4.8E-05	1.1E-03	8.7E-03
35	Turbine Building	T/G oil	1	822.5	2.5E-03	3.5E-05	7.5E-04	6.9E-03
36	Turbine Building	Transient fires caused by welding and cutting	13.5	822.5	2.2E-02	-04	5.5E-03	7.1E-02
37	Turbine Building	Transients	6.75	822.5	1.0E-02	-04	4.3E-03	3.0E-02

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Shutdown Risk

- Lack of model sophistication in measuring shutdown risk
- Shutdown risk dominated by human error
- Timing of events is elongated and not dealt well in our models
- Two schools of thought about shutdown risk vs. on-line risk
- Minimal amount of shutdown regulation

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Questions?
21


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ADDITIONAL SLIDES
22

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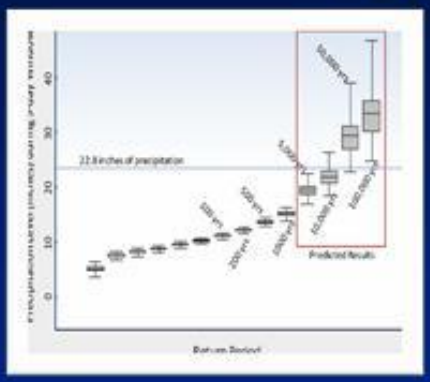
Frequency Determination Using Bayesian Approach



Modelling extreme rainfall condition using Generalize Extreme Value (GEV)

Author: Curtis Smith
Date: November 9, 2012

```
model
{ for(i in 1:N) {
z.p[i] ~ dnorm(mean[i],prec)
z.p.pred[i]~dnorm(mean[i],prec)
y.p[i] <- -log(1 - p[i])
mean[i]<- mu - sigma/xi*(1 -pow(y.p[i],-xi))
}
mu~dnorm(0,0.0001)
xi~dunif(-1,1)
prec<-pow(sd,-2)
sd~dunif(0,10)
sigma~dunif(0,10)
}
data
list(p=c(1,0.5,0.2,0.1,0.04,0.02,0.01,0.005,0.002,0.001,0.0002,1.E-4,2.E-5,1.E-5),
z.p=c(5.453, 6.480, 7.720, 8.650, 9.847, 10.800,11.667, 12.600,13.700,14.567,NA,NA,NA,NA), N=14)
```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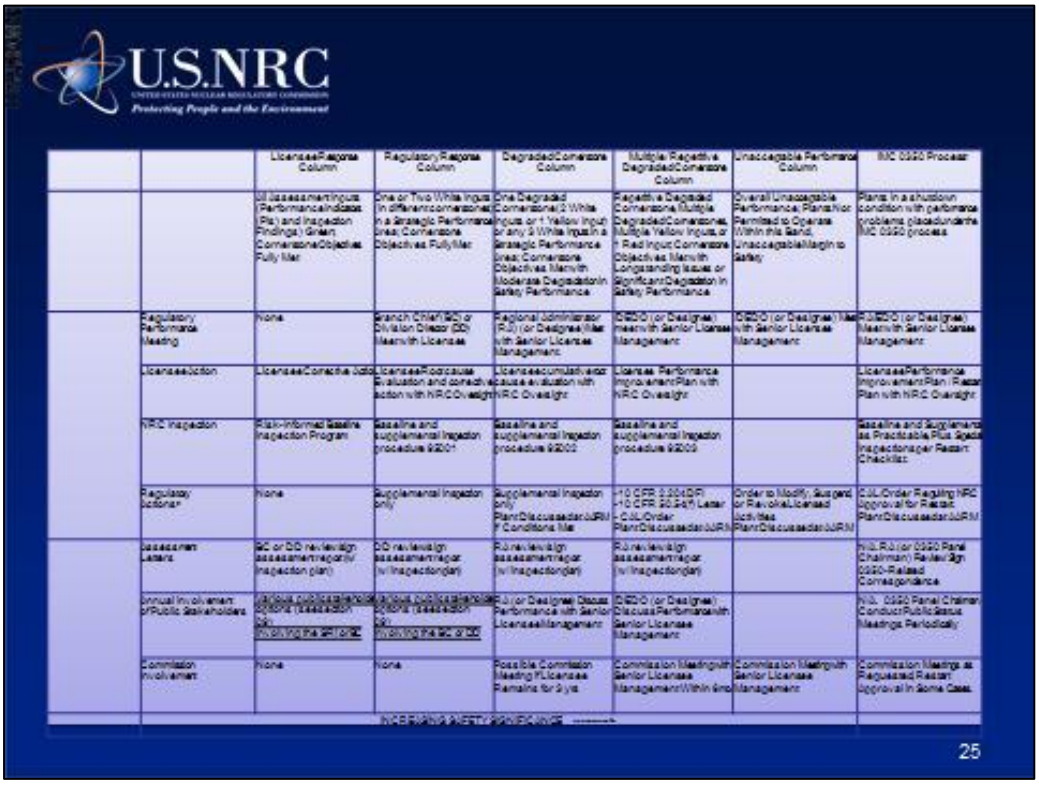
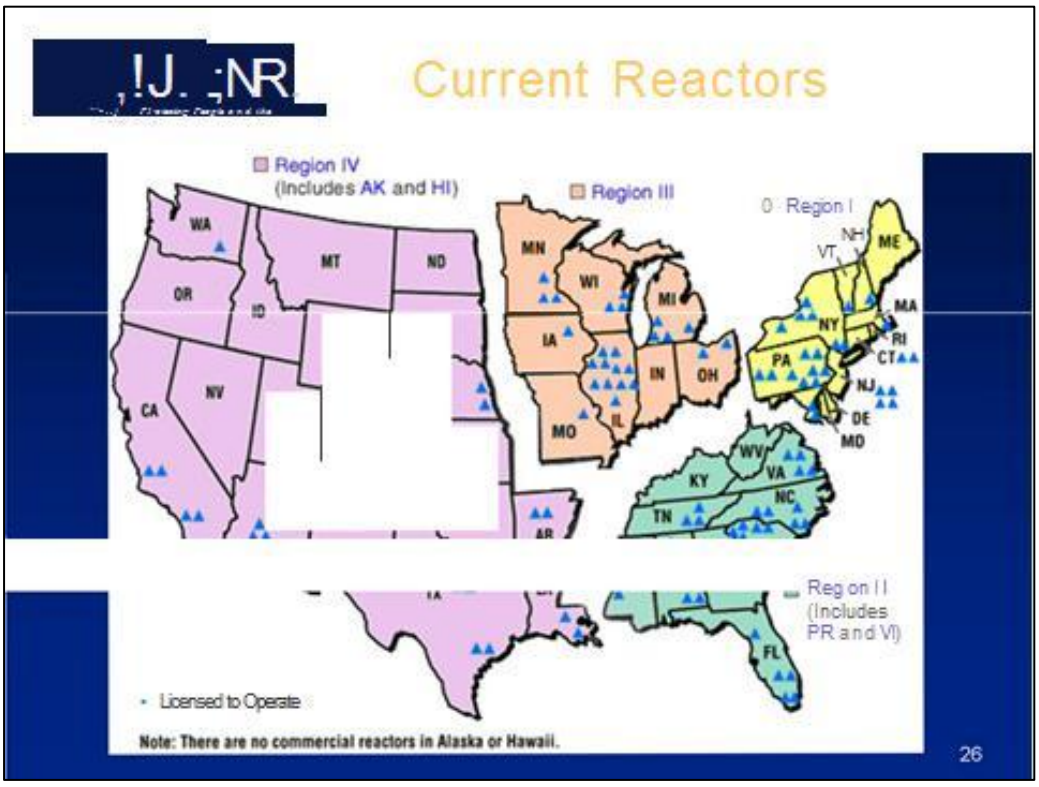
Event Assessments

Operational events and degraded conditions are evaluated for risk significance to determine appropriate reactive inspection

Estimated Conditional Core Damage Probability (CCDP)				
CCDP <1E-6	1E-6 - 1E-5	1E-5 - 1E-4	1E-4 - 1E-3	CCDP >1E-3
No additional inspection				
	Special Inspection			
		AIT		
			IIT	

Table 1: CCDP vs Event Response


U.S.NRC
Protecting People and the Environment
Licensee Response Column
Regulatory Response Column
Degraded Cornerstone Column
Multiple Repetitive Degraded Cornerstone Column
Unacceptable Performance Column
IMC 0350 Process
Regulatory Performance Meeting
None
Branch Chief (BC) or Division Director (DD) Meet with Licensee
Regional Administrator (RA) (or Designee) Meet with Senior Licensee Management
DRP/D (or Designee) meet with Senior Licensee Management
DRP/D (or Designee) Meet with Senior Licensee Management
Licensee Action
Licensee Corrective Actions
Licensee Root cause Evaluation and corrective action with NRC Oversight
Licensee cumulative root cause evaluation with NRC Oversight
Licensee Performance Improvement Plan with NRC Oversight
Licensee Performance Improvement Plan / Restart Plan with NRC Oversight
NRC Inspection
Risk-Informed Baseline Inspection Program
Baseline and supplemental inspection procedure 92001
Baseline and supplemental inspection procedure 92002
Baseline and supplemental inspection procedure 92003
Baseline and Supplemental as Practicable Plus Special Inspection per Restart Checklist
Regulatory Actions*
None
Supplemental Inspection only
Supplemental Inspection only
Plant Discussed at URM
If Conditions Met
10 CFR 2.204(DFI)
10 CFR 50.54(f) Letter
CAL/Order
Plant Discussed at URM
Order to Modify, Suspend, or Revoke Licensed Activities
Plant Discussed at URM
CAL/Order Requiring NRC Approval for Restart
Plant Discussed at URM
Assessment Letters
BC or DD review/sign assessment/report/inspection plan)
DD review/sign assessment/report (w/inspection plan)
RA review/sign assessment/report (w/inspection plan)
RA review/sign assessment/report (w/inspection plan)
NRR, RA (or 0350 Panel Chairman) Review/Sign 0350-Related Correspondence
Annual Involvement of Public Stakeholders
Inform the RA or DD
Inform the BC or DD
RA (or Designee) Discuss Performance with Senior Licensee Management
DRP/D (or Designee) Discuss Performance with Senior Licensee Management
NRR, 0350 Panel Chairman Conduct Public Status Meetings Periodically
Commission Involvement
None
None
Possible Commission Meeting if Licensee Remains for 3 yrs
Commission Meeting with Senior Licensee Management
Commission Meeting with Senior Licensee Management
Commission Meetings as Requested Restart Approval in Some Cases.
25


Current Reactors
Region IV
(Includes AK and HI)
Region III
Region I
Region II
(Includes PR and VI)
WA
OR
CA
ID
NV
MT
ND
MN
WI
MI
IA
IN
OH
IL
MO
AR
NY
PA
NJ
DE
MD
WV
VA
KY
TN
NC
FL
NH
VT
ME
MA
RI
CT
Licensed to Operate
Note: There are no commercial reactors in Alaska or Hawaii.
26

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Reactors Under Construction

27

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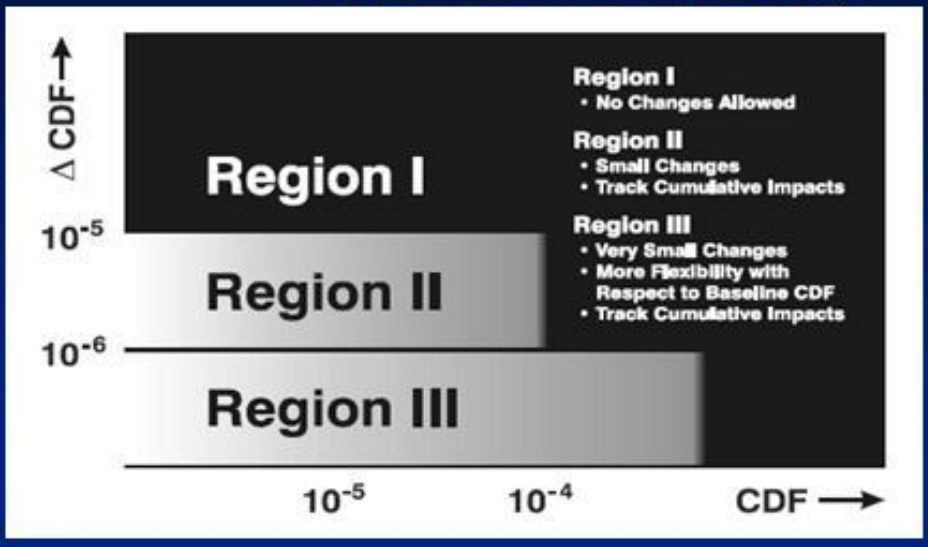
Acceptance Guidelines on Risk for Licensing



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17.2. COUNTERFEIT, FRAUDULENT AND SUSPECT ITEMS (CFSI)

Counterfeit, Fraudulent and Suspect Items (CFSI)

Andrea Valentin, Deputy Director
Division of Construction Inspection and Operational Programs
Office of New Reactors
CNRA/WGIP April 9, 2014

CFSI Remains High-Priority

- Indications of CFSI in the non-nuclear industrial supply chain
- Implementation of appropriate response protocols
- Continued cooperation and information sharing

Recent Examples of Non-nuclear Industrial CFSI

Counterfeit water pump

Counterfeit oil well pipe coupling

Counterfeit butterfly valves

Counterfeit refrigerant bottles

Counterfeit Fire Protection Equipment in Non-nuclear Settings

- NRC Information Notice 2013-02 – Issued March 19, 2013
- Circulates warnings from the U.S. Defense Logistics Agency Headquarters and Underwriters Laboratories, Inc.
- Counterfeit Fire Hoses, Extinguishers, Sprinklers, and Sprinkler Pipe Hangers

Initiatives to Address CFSI

- International
  - Non-conforming, Counterfeit, Fraudulent and Suspect Items (NCFSI) Task Group
  - Working Group on Operating Experience
  - Multinational Design Evaluation Program (MDEP)
- Domestic
  - U.S. Government Agencies
  - Industry Organizations
  - Key Nuclear Suppliers
  - Public Outreach

NRC's CFSI Program Initiatives

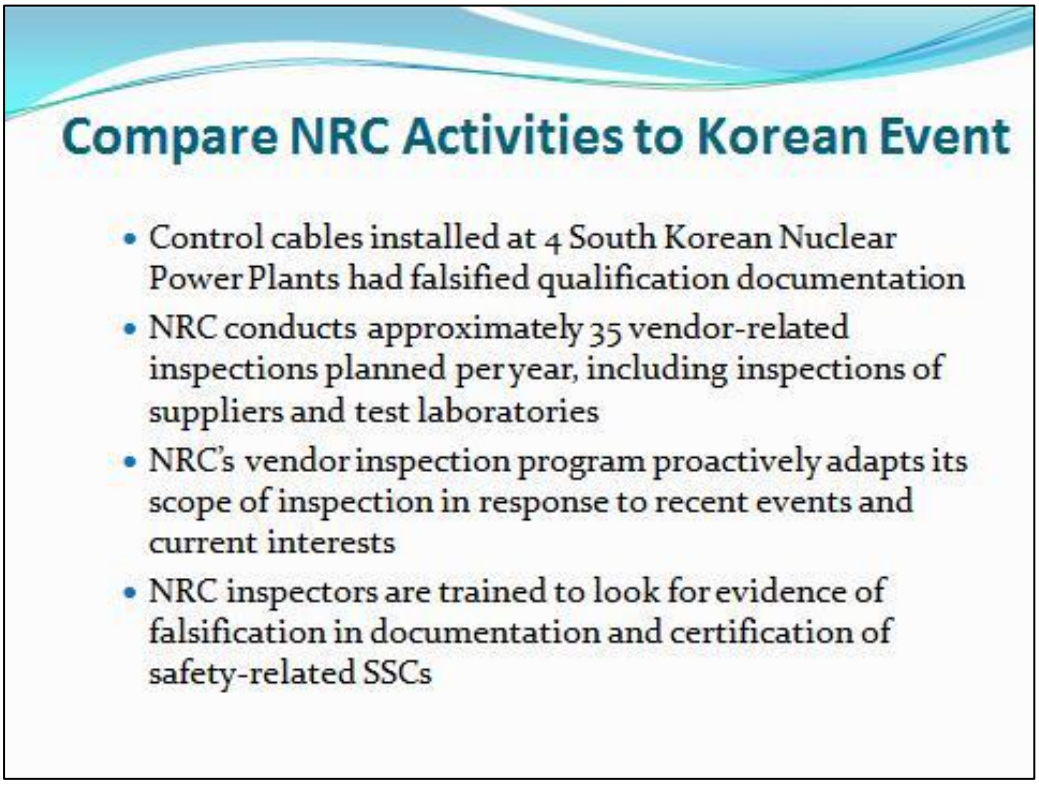
- Remain proactive and ahead of events or threats
- Generic communications planned to explain the existing regulatory framework and clarify its applicability to CFSI
- NRC is engaged with other Government agencies to gain knowledge and experience
- Licensee and vendor inspection procedures now include detailed questions directly related to a vendor's CFSI program

Typical CFSI Vendor Inspection Questions

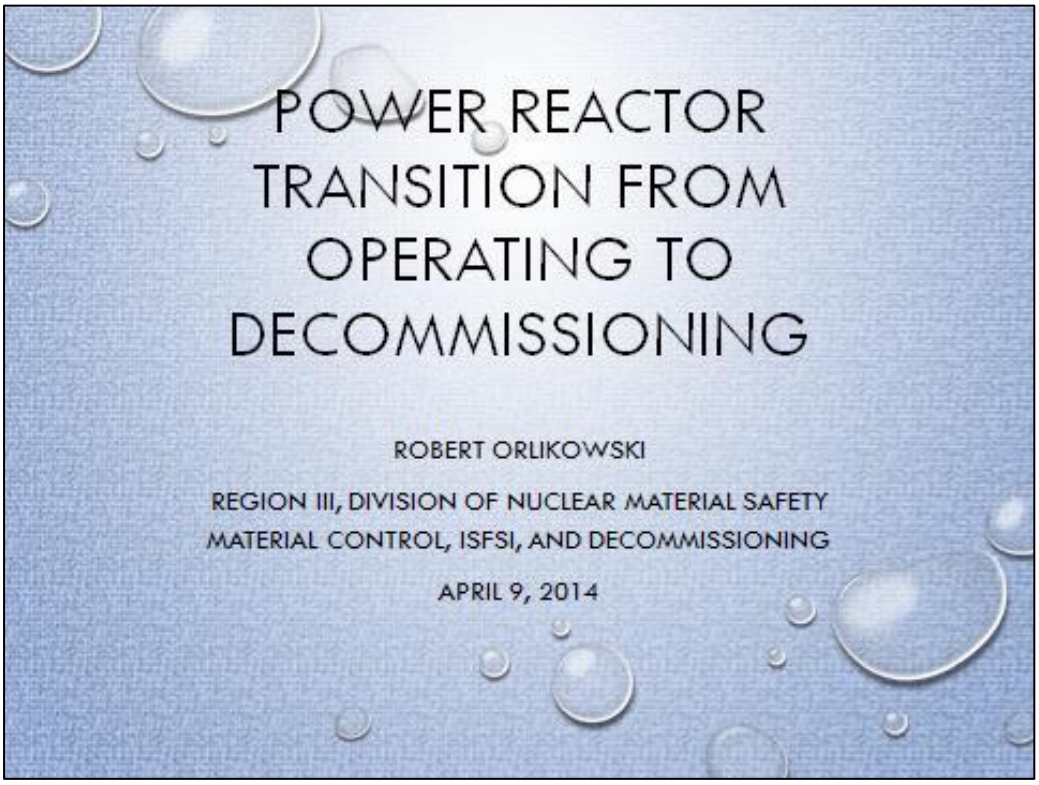
- Licensee or vendor programs for handling CFSI?
- Actions taken upon discovery of CFSI?
- Use of internal and external Operating Experience to proactively anticipate harmful events?
- Inclusion of anti-CFSI language in Purchase Orders?
- Staff training?
- Knowledge of NRC's allegation process?
- Follow industry best practices?

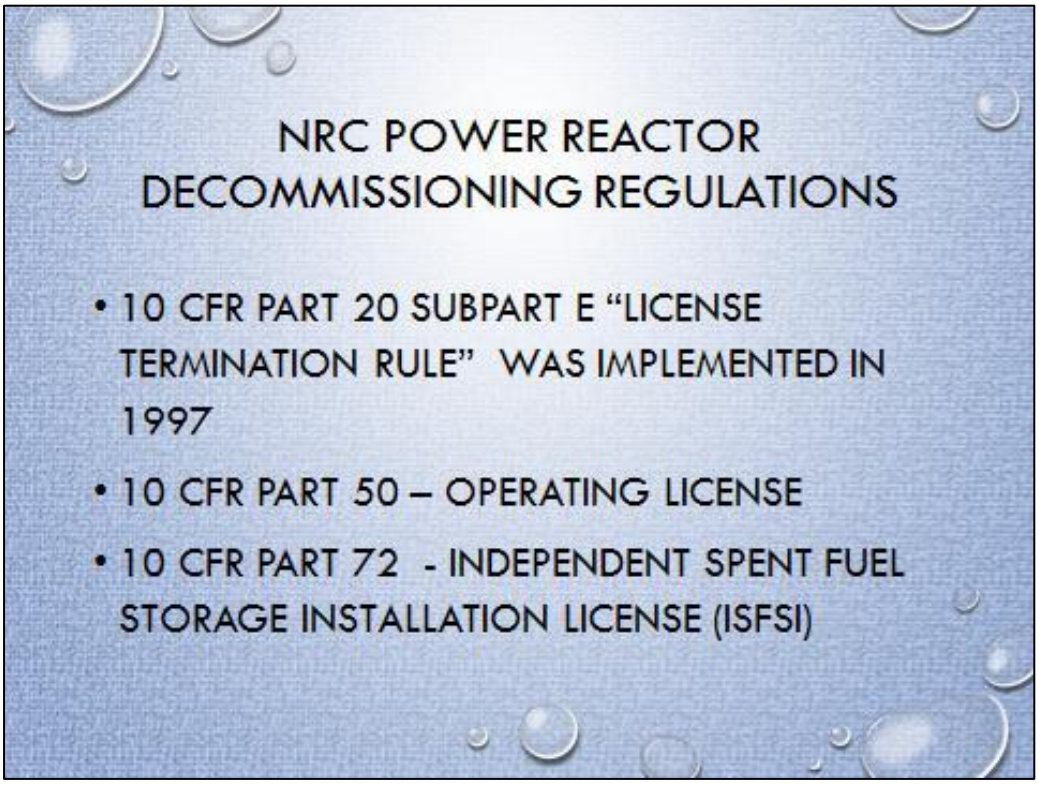
NRC's CFSI Program Developments

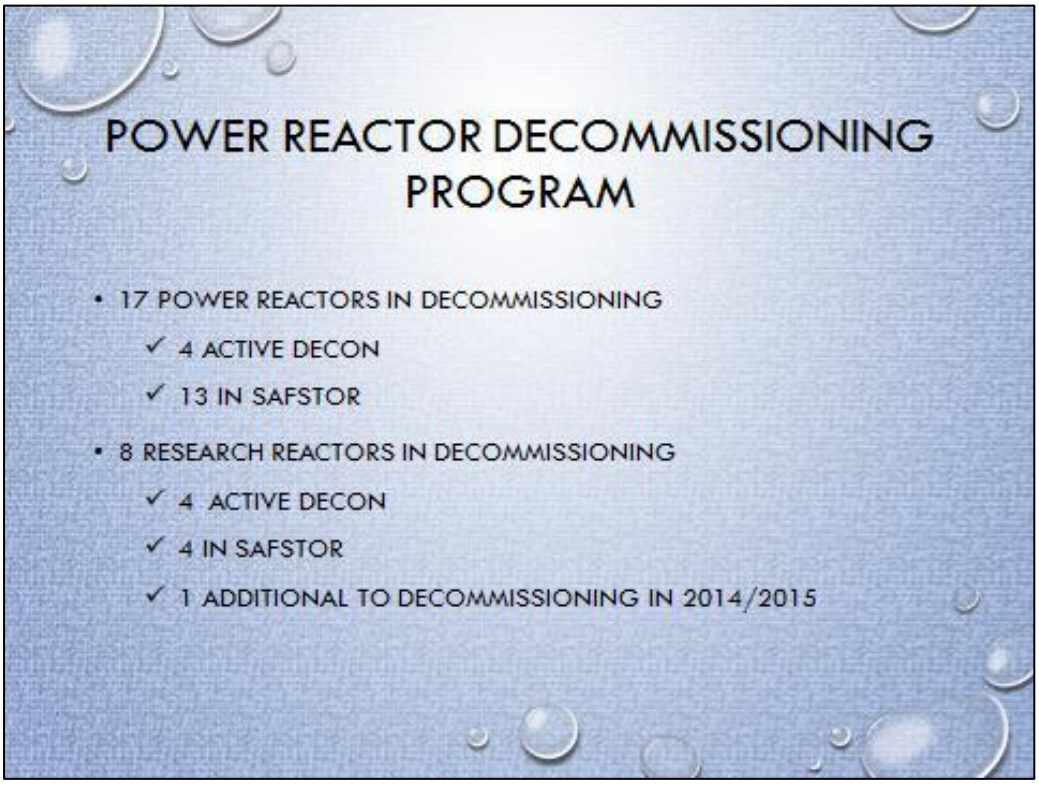
- CFSI Steering Committee regularly convened to gain senior executive input from each NRC office for a collaborative agency-wide effort
- CFSI SECY paper planned for Oct 2014 to provide updates to action items from 2011 SECY paper
- Interacting with industry on their development of voluntary initiatives, including the EPRI/NEI draft report on CFI
- Stakeholders involved through interactions including 6 public meetings to date, with more planned near future

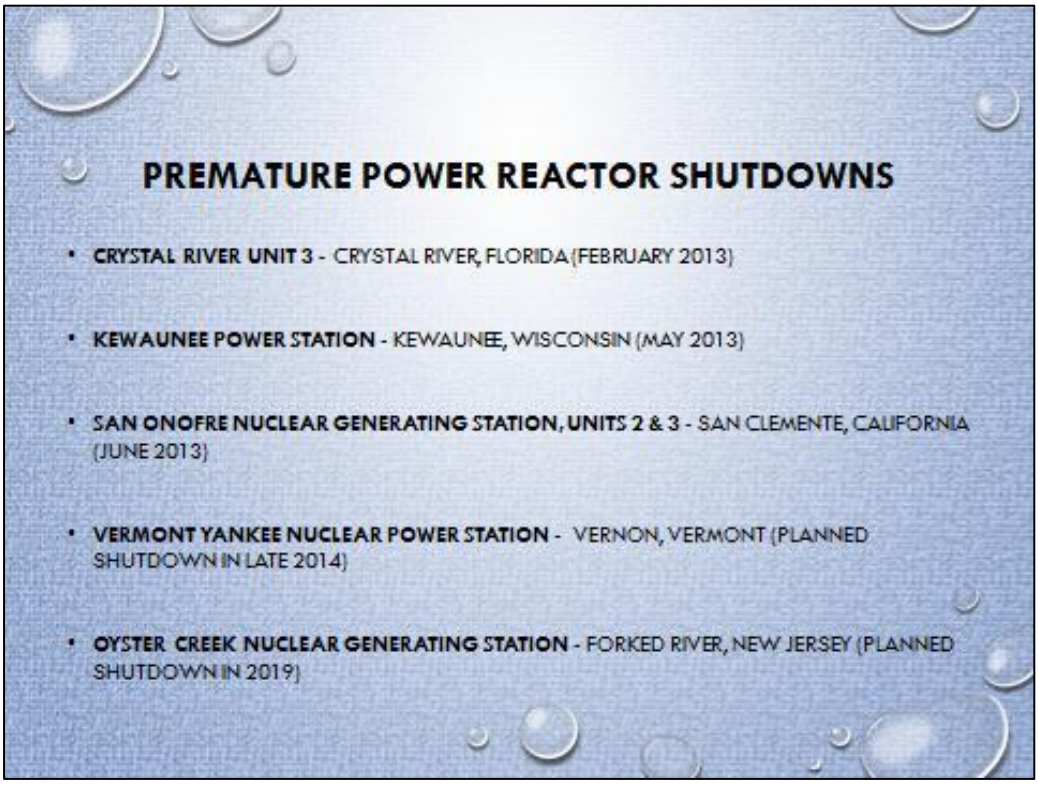

Compare NRC Activities to Korean Event
• Control cables installed at 4 South Korean Nuclear Power Plants had falsified qualification documentation
• NRC conducts approximately 35 vendor-related inspections planned per year, including inspections of suppliers and test laboratories
• NRC's vendor inspection program proactively adapts its scope of inspection in response to recent events and current interests
• NRC inspectors are trained to look for evidence of falsification in documentation and certification of safety-related SSCs

17.3. POWER REACTOR TRANSITION FROM OPERATING TO DECOMMISSIONING


POWER REACTOR TRANSITION FROM OPERATING TO DECOMMISSIONING
ROBERT ORLIKOWSKI
REGION III, DIVISION OF NUCLEAR MATERIAL SAFETY
MATERIAL CONTROL, ISFSI, AND DECOMMISSIONING
APRIL 9, 2014


NRC POWER REACTOR DECOMMISSIONING REGULATIONS
• 10 CFR PART 20 SUBPART E "LICENSE TERMINATION RULE" WAS IMPLEMENTED IN 1997
• 10 CFR PART 50 – OPERATING LICENSE
• 10 CFR PART 72 - INDEPENDENT SPENT FUEL STORAGE INSTALLATION LICENSE (ISFSI)


POWER REACTOR DECOMMISSIONING PROGRAM
• 17 POWER REACTORS IN DECOMMISSIONING
✓ 4 ACTIVE DECON
✓ 13 IN SAFSTOR
• 8 RESEARCH REACTORS IN DECOMMISSIONING
✓ 4 ACTIVE DECON
✓ 4 IN SAFSTOR
✓ 1 ADDITIONAL TO DECOMMISSIONING IN 2014/2015


PREMATURE POWER REACTOR SHUTDOWNS
• CRYSTAL RIVER UNIT 3 - CRYSTAL RIVER, FLORIDA (FEBRUARY 2013)
• KEWAUNEE POWER STATION - KEWAUNEE, WISCONSIN (MAY 2013)
• SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 & 3 - SAN CLEMENTE, CALIFORNIA (JUNE 2013)
• VERMONT YANKEE NUCLEAR POWER STATION - VERNON, VERMONT (PLANNED SHUTDOWN IN LATE 2014)
• OYSTER CREEK NUCLEAR GENERATING STATION - FORKED RIVER, NEW JERSEY (PLANNED SHUTDOWN IN 2019)

TRANSITION ACTIVITIES

- NOTIFICATION OF PERMANENT CESSATION OF OPERATION AND PERMANENT REMOVAL OF FUEL FROM THE REACTOR
- SUBMITTAL OF POST SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT AND PUBLIC MEETING
- INSPECTION OVERSIGHT
- LICENSING BASIS
- PROGRAM OVERSIGHT RESPONSIBILITY

TRANSITIONING FROM OPERATING TO DECOMMISSIONING REGULATORY APPROACH

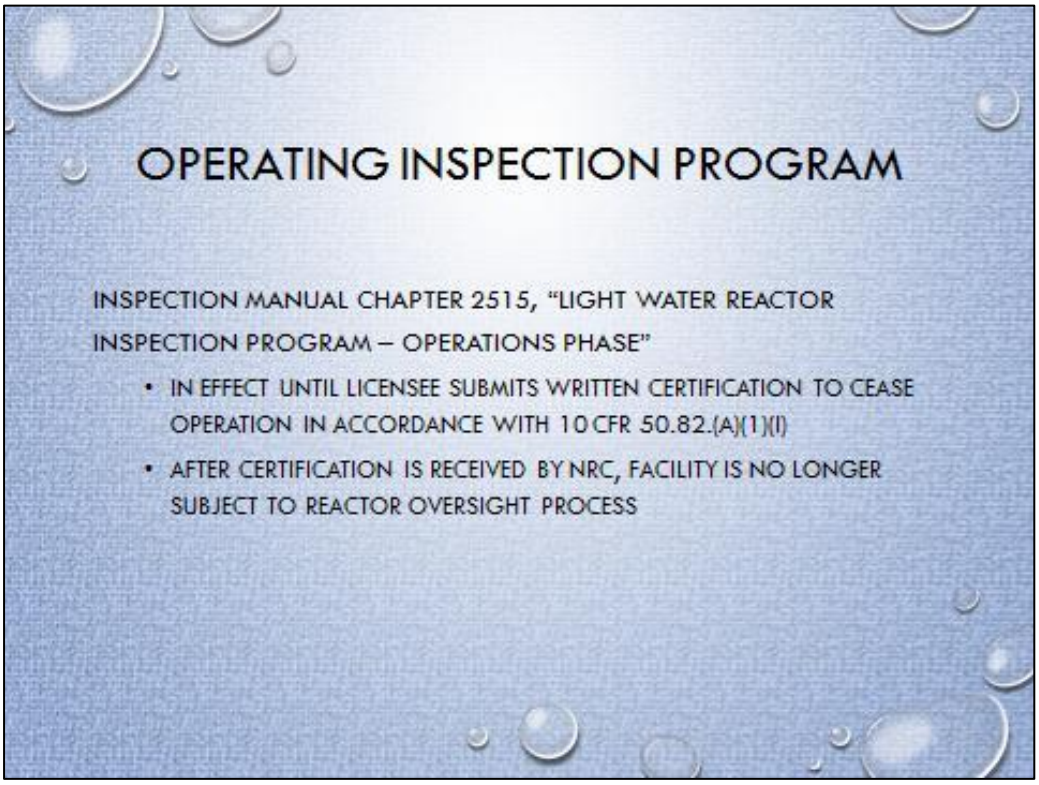
- LICENSING BASIS ESSENTIALLY UNCHANGED AFTER SHUTDOWN
- FOLLOWING ESTABLISHED PRECEDENT
- LESSONS LEARNED FROM PLANT SHUTDOWNS IN 1990S
- SIGNIFICANT EVENTS SINCE 2000
  - SEPTEMBER 11, 2001 ATTACKS
  - MARCH 11, 2011 TŌHOKU EARTHQUAKE AND TSUNAMI

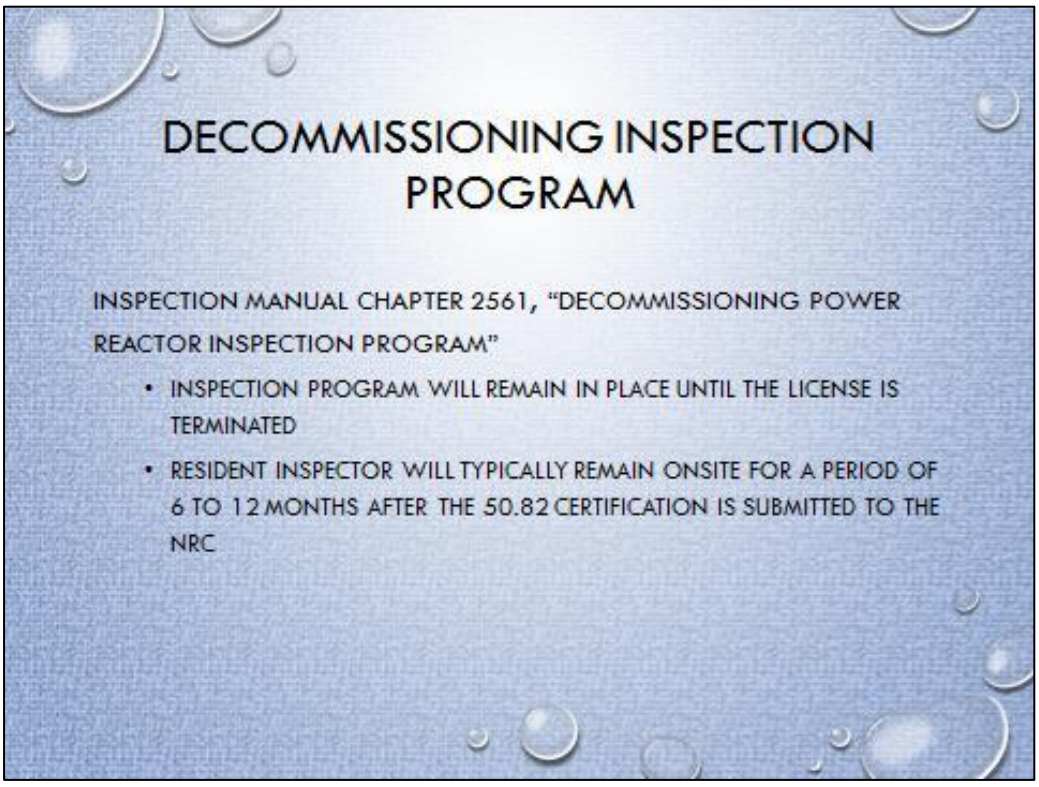
TRANSITION FROM OPERATING TO DECOMMISSIONING NRR ROLE

- **LICENSE AMENDMENTS**
  - DEFUELED TECHNICAL SPECIFICATIONS
  - REVISED EMERGENCY PLAN, EMERGENCY ACTION LEVEL SCHEME AND SECURITY PLAN
  - STAFFING, TRAINING AND QUALIFICATIONS
- **EXEMPTIONS FROM TITLE 10 CODE OF FEDERAL REGULATIONS (CFR)**
  - EMERGENCY PLANNING AND PREPAREDNESS (10 CFR 50.47, APPENDIX E TO PART 50)
  - PHYSICAL PROTECTION (10 CFR PART 73)
  - DECOMMISSIONING TRUST FUND (10 CFR 50.82)
- **REQUESTS TO RESCIND OR RELAX JAPAN LESSONS LEARNED ACTIONS**
  - ORDERS
  - 10 CFR 50.54(F) REQUESTS FOR INFORMATION

COORDINATION AND COMMUNICATIONS

- NRC WORKING GROUP ON DECOMMISSIONING TRANSITION
  - NRR, FSME, OFFICE OF NUCLEAR SECURITY AND INCIDENT RESPONSE, REGIONAL OFFICES AND OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
  - SHORT TERM: INCREASE EFFECTIVENESS OF EXISTING PROCESS
    - FACILITATE RESOLUTION OF CHALLENGES
    - ENHANCE COMMUNICATIONS AND COORDINATION
  - LONG TERM: RECOMMEND REGULATORY CHANGES TO IMPROVE THE PROCESS
    - RULEMAKING AND GUIDANCE DEVELOPMENT
    - POLICY CHANGES
- PUBLIC AND INTERGOVERNMENTAL MEETINGS AND OUTREACH


OPERATING INSPECTION PROGRAM
INSPECTION MANUAL CHAPTER 2515, "LIGHT WATER REACTOR INSPECTION PROGRAM – OPERATIONS PHASE"
• IN EFFECT UNTIL LICENSEE SUBMITS WRITTEN CERTIFICATION TO CEASE OPERATION IN ACCORDANCE WITH 10 CFR 50.82.(A)(1)(I)
• AFTER CERTIFICATION IS RECEIVED BY NRC, FACILITY IS NO LONGER SUBJECT TO REACTOR OVERSIGHT PROCESS


DECOMMISSIONING INSPECTION PROGRAM
INSPECTION MANUAL CHAPTER 2561, "DECOMMISSIONING POWER REACTOR INSPECTION PROGRAM"
• INSPECTION PROGRAM WILL REMAIN IN PLACE UNTIL THE LICENSE IS TERMINATED
• RESIDENT INSPECTOR WILL TYPICALLY REMAIN ONSITE FOR A PERIOD OF 6 TO 12 MONTHS AFTER THE 50.82 CERTIFICATION IS SUBMITTED TO THE NRC


DECOMMISSIONING INSPECTION PROGRAM
INSPECTION PROGRAM COMPRISES TWO MAJOR ELEMENTS:
• CORE INSPECTION
• DISCRETIONARY INSPECTIONS (I.E. REACTIVE AND INITIATIVE INSPECTIONS)
INSPECTION HOUR ESTIMATES ARE BASED ON DECOMMISSIONING ACTIVITIES AND WILL VARY FROM SITE TO SITE


DECOMMISSIONING INSPECTION PROGRAM
CORE INSPECTIONS INCLUDE:
• ORGANIZATION AND MANAGEMENT CONTROL
• QUALITY ASSURANCE
• SPENT FUEL WET STORAGE AND HANDLING
• MAINTENANCE AND SURVEILLANCE
• RADIATION PROTECTION
• SECURITY
• SAFETY EVALUATIONS


DECOMMISSIONING INSPECTION PROGRAM
DECOMMISSIONING ACTIVITIES ARE GROUPED IN SIX CATEGORIES
1. POST-OPERATION TRANSITION PHASE (~473 HRS)
2. ACTIVELY DECOMMISSIONING, FUEL IN THE POOL (~443 HRS)
3. ACTIVELY DECOMMISSIONING, NO FUEL IN POOL (~362 HRS)
4. SAFSTOR, FUEL IN THE POOL (~155 HRS)
5. SAFSTOR, NO FUEL IN THE POOL (~107 HRS)
6. FINAL SURVEYS UNDERWAY, NO FUEL IN POOL (~165 HRS)
SAFSTOR: CONDITION ALLOWING FOR THE FACILITY TO BE SAFELY STORED AND SUBSEQUENTLY DECONTAMINATED FOR RELEASE


QUESTIONS?

17.4. A DAY IN THE LIFE OF A NUCLEAR PLANT RESIDENT INSPECTOR


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
A Day in the Life of a
Nuclear Plant Resident Inspector
12th International CNRA/WGIP
Workshop 2014
U.S. Nuclear Regulatory Commission
Chattanooga, TN
April 9, 2014


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
Resident Inspector Program Video
2

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Protecting People and the Environment

A Typical Daily Agenda

- 0615 – 0630: Arrive on site
- 0630 – 0730: Plant status review/ walk down MCR
- 0745 – 0800: Conference call with Regional Office
- 0830 – 0900: Licensee led Plan of the Day Meeting
- 0900 – 1100: In plant inspection/ document review
- 1100 – 1145: Lunch
- 1145 – 1515: In plant inspection/ document review
- 1515 – 1530: Depart site

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Inspection Areas

- Adverse Weather/Grid Stability
- Equipment Alignment
- Fire Protection
- Internal/External Flooding
- Heat Exchanger Performance
- Licensed Operator Performance
- Maintenance Effectiveness
- Maintenance Risk/ Emergent Work
- Operability Evaluations
- Modifications
- Post Maintenance Testing
- Refueling/Maintenance Outages
- Surveillance Testing
- Performance Indicators
- Problem Identification & Resolution
- Event Response
- Emergency Preparedness
- Security (observations)

4

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Region I – Three Mile Island

- 2 Babcock & Wilcox PWRs
- 1 unit in PDMS; 1979 Accident
  '*Post-Defueled Monitored Storage*'
- 2 owners
- 2 inspectors (1 SRI, 1 RI)
  Oversight of TMI-1
  1st Responders to TMI-2
- 2 year refueling cycle
- Active stakeholder interests
- Only site on an island

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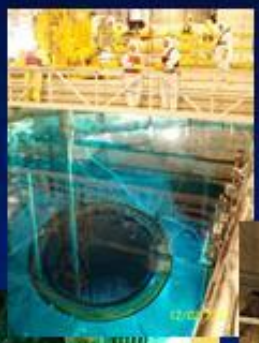

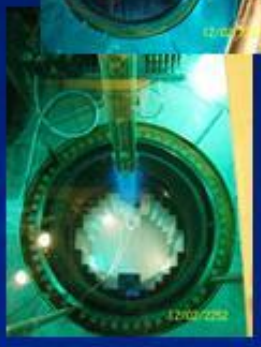

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Region II – Vogtle Units 1-4 NPPs

- 2 Westinghouse 4 - Loop PWRs
- 2 Westinghouse AP1000 Units (under construction – on-line 2017 & 2018
- Soon to be the largest power producer in US
  - Combined Mwe 4800/hr
- Four owners
- 6 inspectors (2 SRI, 4 RI)
- 18 month refueling cycle
- Utilizes self-contained, dual train per unit nuclear service cooling water (NSCW) as UHS. 3.6 million gallon cistern of deep-well pump fed water per train

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Vogtle Units 3 & 4 as of February 2014

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Region III – Dresden NPS







- 3 General Electric BWR
- Unit 1 SAFSTOR
  - 1st Commercially Funded Nuclear Plant in the World (1960)
- Units 2 & 3 BWR 3 with MK 1 Containments
- Licensee – Exelon
- 2 US NRC Resident Inspectors and 1 Illinois EMA Inspector
- Each unit on a 2 year refueling cycle

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Region IV – Palo Verde NGS

- 3 Combustion Engineering System 80 PWRs
- Largest power producer in US
  - 2013: 31 million MW hours
- Six owners
- 3 inspectors (1 SRI, 2 RI)
- 2 refueling outages per year
- Utilizes treated sewage effluent for cooling water (onsite water reclamation facility for wastewater from city of Phoenix)
- Spray ponds serves as ultimate heat sink

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NRC Region-Based Inspections

- Engineering Teams:
  - Component Design Bases, Heat Sink, Plant Modifications
- Security: Program, Force on Force, Cyber
- Fire Protection Teams
- Health Physics
- Emergency Preparedness

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Specialized Issues - groundwater

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17.5. TECHNICAL TRAINING CENTRE – OVERVIEW

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HRTD

United States Nuclear Regulatory Commission
Technical Training Center
Chattanooga, Tennessee

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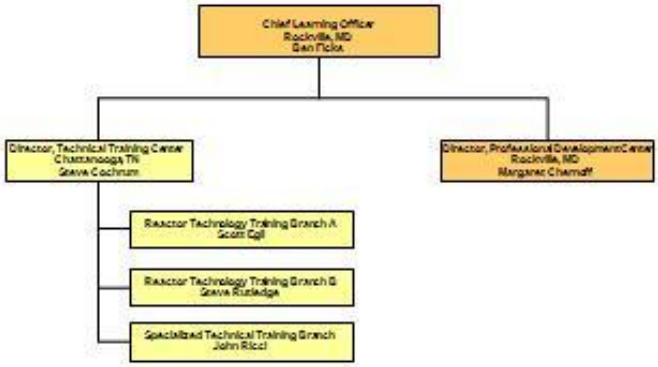
HRTD

Technical Training Program Resources

- **Technical Training Center Staff**
  - 40 NRC staff
  - 7 contract staff
- **Technical Training Center Budget**
  - $5,740,000 for fiscal year 12
  - Approximately $5,852,000 in salaries and benefits for TTC alone
- **Technical Training Center Facility**
  - 63,000 Square Feet
  - 8 Classrooms
  - Four full-scope control room simulators
  - Two limited-scope generic digital simulation platforms
  - Hardware Training Aids
  - Electronic Teaching Aids

2

NRC Training Organization



Quick History of NRC Training

- 1980 Reactor Training Center opened in Chattanooga, TN. Used TVA Simulators.
- 1983 Reactor Training Center renamed the Technical Training Center (TTC).
- 1986 GE BWR/6 Simulator was installed. Decommissioned 1999.
- 1987 Westinghouse SNUPPS Simulator installed. Decommissioned 1996.
- 1988 B&W Simulator installed.
- 1992 CE Simulator installed.
- 1994 GE BWR 4 Simulator installed
- 1995 Westinghouse 4-Loop Simulator installed.
- 2006 Development of Advance Reactor training courses begins.
- 2007 AP1000 "short courses" completed. Short courses delivered to nuclear regulatory staff of China and Canada.
- 2010 Development of digital control room training simulators based on advanced control room and reactor designs is initiated.
- 2011 TTC staff attends AP1000 training at Westinghouse HQ.
- 2012 AP1000 classroom training initiated for license operations examiners and inspection staff.
- 2013 Completed development of AP1000 "like" Training Simulator.

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TTC Clientele

- **Inspectors**
  - NRC
    - Region-based inspectors
    - Resident inspectors
    - HQ-based inspectors
  - Agreement States
    - 37 States that inspect NRC licensees
    - Nuclear materials inspectors
    - Radiation protection inspectors
  - International
    - International regulatory staff through agreements with OIP
- **NRC Technical staff**
  - Licensing staff
  - Incident response staff
  - Legal and other staff
- **Volume**
  - Over 1800 training "instances" in FY2012
  - 500 non-NRC

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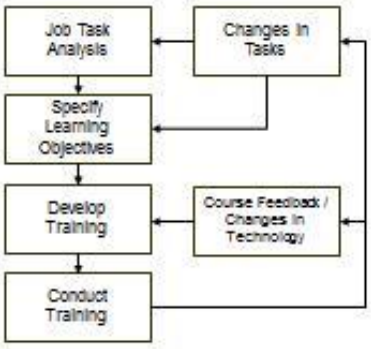
The NRC Approach to Training

- The ultimate objective is to meet the agency's safety and security mission
- Training exists to ensure that knowledge and skills are transferred to staff members as necessary to support "qualification" in particular roles
  - Qualification standards are established for key positions
  - Formal training forms only a part of the activities required for qualification
  - Training is aimed at transferring job-related knowledge and skills



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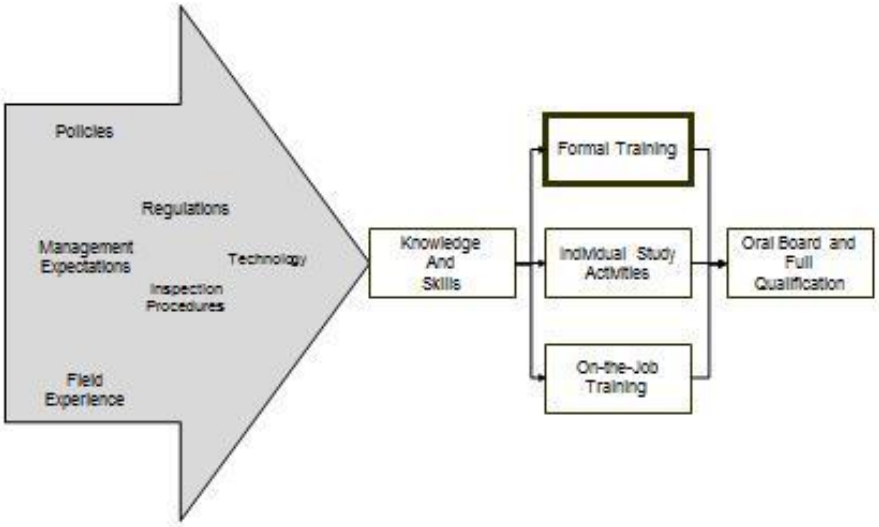
Inspector Qualification



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CURRENT REACTOR TECHNOLOGY CURRICULUM

- Covers all 4 Current U.S. Light Water Reactor Design
  - New reactor designs being added
- Classroom and Simulator Courses
- Typical Students
  - Resident Inspectors
  - Regional Reactor Inspectors
  - Headquarters Operations Officers
  - Operator Licensing Examiners
  - Participants in Formal Development Programs
  - Other Government and International Agencies

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Reactor Technology Training Required for Qualification

Westinghouse PWR or GE BWR Tracks

Technology Training (3 weeks) → Advanced Technology Training (2 weeks) → Simulator Training (2 weeks)

Operator License Examiner Training

Training on Written Exams (.5 weeks) → Training on Operating Exams (1 week)

Existing Cross-Training

B&W Cross Training (3 weeks)

CE Cross Training (3 weeks)

Planned Cross-Training

AP-1000 Cross Training (3 weeks)

9

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Simulators are an Integral Part of NRC Training

Why Simulators are used

- To integrate plant systems training obtained in the classroom
- To learn equipment functions and control
- To exercise plants' normal operating, alarm, abnormal and emergency operating procedures
- To apply plants' technical specifications
- To understand operators' roles
- To train on control room-related regulatory functions

Other Uses

- Support non-qualification-related training
- Support human factors and other research
- Support incident response drills

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NRC Training Simulators

Existing NRC Simulators

- Westinghouse PWR – Purchased from PG&E (Trojan)
- Babcock and Wilcox PWR – Purchased from WPPSS
- Combustion Engineering PWR – Purchased from CE (Calvert)
- General Electric BWR – Purchased from Lilco (Shoreham)

AP1000 Simulator Development

- Contracted with CORYS Thunder, Inc. (CTI) to rehost the NRC's 4-Loop Westinghouse simulator model and to deliver a digital simulator platform with the new models loaded onto it.
- Digital Platform delivered and site acceptance testing completed December 2011.
- Contracted with GSE for development of models to closely approximate the AP1000 design for use on the digital platform.
- Models delivered and loaded June 2013.

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Specialized Technical Training

- 11 Courses on Engineering Topics
- 6 Courses on Fuel Cycle Topics
- 14 Courses on Regulatory Skills Topics
- 17 Courses on HP Topics
- 22 Courses on Risk Topics
- 8 Courses on Security Topics

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Health Physics Training

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Security Training

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